

Short rotation coppice in the UK

A briefing for policymakers

Introduction

The UK is committed to producing 15% of its total energy and 12% of its heat from renewable resources by 2020.¹ These are very tough targets and achieving them will require significant uptake in all renewable energy technologies. Of these, biomass is seen as the principal way of producing renewable heat but can involve many different conversion technologies utilising a large range of biomass materials. The origin and use of certain biomass feedstocks, particularly those that are imported or perceived to displace food crops, have recently come under increased scrutiny and questions regarding their sustainability credentials have been the subject of much debate.^{2,3}

Home-grown energy crops however, have been widely recognised for their potential to play a major role in the UK's sustainable energy mix and, unlike imported biomass, can increase security of supply and income generation in rural communities. The Government's Bioenergy Strategy⁴ published in April 2012 predicts that the greatest increase in domestic bioenergy supply by 2030 will come from agricultural residues and energy crops.

Short rotation coppice (SRC) is a form of energy crop where fast growing trees such as willow or poplar are cultivated and then repeatedly harvested on a three-year cycle. The freshly-harvested product can be burnt in power stations and some types of large-scale woodfuel heating

plant but can also be used in smaller-scale boilers when processed into more refined forms of woodfuel. SRC is considered to be a low carbon fuel as CO₂ emissions released during combustion will be re-absorbed by new growth.

However, SRC is not just about sustainable woodfuel. It can also help solve a number of other environmental issues including water quality improvement (e.g. diffuse water pollution from agriculture in sensitive catchments), rebuilding bee and other pollinator populations, carbon sequestration and reduction in soil erosion.⁵ In addition to this, SRC has a distinct advantage over native tree planting when used as a flood defence measure.⁶

The coppice nature of the crop reduces the flow of flood water and in certain circumstances could delay floods downstream. Crucially, the fast growing nature of SRC means that it can achieve this in just a few years whereas it could take decades to achieve the same impact from slower growing native trees. SRC can be grown on lower-grades of agricultural land that do not support food crops, thus dispelling the myth that it will overly compete with food production.





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When targeted at specific areas, growing SRC can also deliver a range of economic and social benefits. It can, for instance, particularly benefit communities without access to cheap mains gas where fuel poverty can be prevalent, or those that lack woodland where the local woodfuel resource may be limited. In these cases SRC can offer cheap local supplies of woodfuel to help lift households out of fuel poverty, create local jobs and help local farmers and landowners diversify their income.

The UK Government has undertaken various initiatives to develop the energy crops sector over the last 20 years but there are currently not enough incentives to make an impact. These crops are still seen as a fringe activity by most farmers and there are few examples of complete 'field to furnace' supply chains. Many large scale projects have failed to get off the ground due to issues around planning permission, financing and lack of policy support.

Considering its multifunctional benefits, SRC projects should enjoy similar advantages to those provided by woodland grant schemes, which include grants for native tree planting for flood defence, establishing woodfuel supplies from undermanaged or inaccessible woodlands, and woodland creation. We certainly need more trees, but planting native trees now won't provide any renewable energy feedstock potential or markets for wood until 2030 at the earliest, whereas planting energy crops could achieve results by 2020.

Crops for Energy Ltd, together with Dorset County Council and the Centre for Sustainable Energy are currently involved in a three-year EU-funded project called ROKWOOD (www.rokwood.eu) which focuses on SRC (rather than energy crops in general) and the obstacles and barriers that hinder its production. The project is international in scope, however within the UK the research has a primary focus on the south west of England. We believe that SRC has the potential to make a significant and viable contribution to the UK sustainable energy mix of the future and that its multifunctional characteristics further justify its use as an environmentally and economically beneficial crop.



- 1 National Renewable Energy Action Plan for the United Kingdom, Article 4 of the Renewable Energy Directive 2009/28/EC
- 2 See 'Common concerns about biomass energy' (CSE 2014) for an overview of the issues (due to be published late 2014)
- 3 www.gov.uk/government/publications/life-cycle-impacts-of-biomass-electricity-in-2020
- 4 www.gov.uk/government/uploads/system/uploads/attachment_data/file/48337/5142-bioenergy-strategy-.pdf
- 5 www.crops4energy.co.uk/wp-content/uploads/2013/07/Position-paper-final-updated.pdf
- 6 Rosolova, Z. et al. (2010) Energy crops on flood plains – Flood risk or benefit? <http://meetingorganizer.copernicus.org/EGU2010/EGU2010-6681.pdf>



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The policy briefs

One of the outputs of ROKWOOD is to develop a series of policy briefs designed to inform national and local policymakers, or indeed anyone with influence, on the most appropriate steps we think are needed to develop the SRC industry. The following pages contain the results of this task – a set of four recommendations that we hope will encourage the right policy framework in the UK and enable the industry to finally achieve its full potential.

The recommendations set out within these policy briefs are intended to specifically target the market for SRC, however it is important to be aware that many of the issues noted are equally applicable to the market for miscanthus.

The four policy briefs have been developed through a detailed methodological analysis of the industry, through discussions with UK stakeholders and by drawing on the collective experience of our ROKWOOD partners. The briefs are complimentary and to a large extent mutually dependent i.e. all four recommendations will need to be rolled out at some level to achieve the overall objective of kick-starting the SRC industry. Each brief summarises a specific policy recommendation and provides supporting text on the relevant issues, potential solutions, resulting benefits and a suggested target audience.

The four policy briefs deal with the following issues:

1. Evidence base review of short rotation coppice costs and benefits
2. Enabling short rotation coppice harvesting, storage and processing infrastructure to supply local heat markets
3. Lowering investment risk for short rotation coppice growers
4. Matching supply and demand to help achieve economies of scale



Contact details

The attached policy briefs are being circulated to a wide range of policy makers, researchers and practitioners during autumn 2014 and we would welcome input to improve and refine them where appropriate. If you have any comments on the briefs or would like further information, please contact either:

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List of Rokwood project partners

- Germany: tzt Bremerhaven, Agraligna, Regional Planning Authority Altmark
- Spain: Institute of Agricultural and Fishery Research and Training, ASAJA Granada, BioAzul, Granada Energy Agency
- Ireland: Bio-tricity, Dublin Institute of Technology/Dublin Energy Lab, Western Development Commission
- UK: Centre for Sustainable Energy, Crops for Energy, Dorset County Council
- Poland: EKSPERT-SITR, Gmina Zaluski, Mazovian Agricultural Advisory Centre
- EU: European Biomass Association
- Sweden: SalixEnergi Europa, Scania's Association of Local Authorities, SP Technical Research Institute of Sweden Sweden



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Evidence base review of short rotation coppice costs and benefits

Policy recommendation summary

DEFRA, DECC and affiliated organisations (Environment Agency, Natural England and Forestry Commission) should support an evidence base review and cost/benefit analysis of the multifunctional benefits of short rotation coppice (SRC).

This would seek to achieve recognition and acceptance of research outputs that demonstrate the multifunctional environmental and socio-economic benefits provided by SRC.

What's the issue?

Short rotation coppice (SRC) is more than an energy crop; it is a multi-functional crop with a range of environmental benefits. It has a unique set of attributes based on its ability to be easily propagated, its fast growth and low level of inputs. SRC has the potential to:

- Help boost the economy through job creation, local retention of revenue and diversification of income for farmers and landowners
- Help solve socio-economic issues such as reducing fuel poverty through low-cost local woodfuel supply
- Achieve local and national energy and environmental goals such as increasing security of supply and reducing carbon emissions
- Provide a whole host of practical applications and ecosystem services such as flood defence, water quality improvement and increases in populations of beneficial insects.

Other crop options can deliver some of these benefits, but only SRC willow can provide a full

package and provide these benefits rapidly. Although there is already a significant body of evidence to support these claims, it needs to be consolidated and further research undertaken to value the benefits as a whole. Unfortunately, the breadth of potential across different areas means that use of SRC straddles Government departmental remits and typically falls between two stools - with the result that incentives for SRC production are not being implemented and opportunities not realised.

How could this be tackled?

A full evidence base review and cost/benefit analysis of SRC production and use should be undertaken to demonstrate the multifunctional environmental and socio-economic benefits offered by SRC. This would need Government sponsorship and employ a robust methodology so it can form part of a nationally-accepted evidence base for SRC development.

Evidence base review of short rotation coppice costs and benefits

What are the benefits?

Establishment of an up-to-date evidence base on SRC costs and benefits would help to clarify opportunities and roles within Government departments and trigger constructive and coordinated policy initiatives and incentives. As a national initiative, it would consolidate existing evidence, identify research gaps and help gain a broad consensus on the need for future actions and priorities.

It would also help raise awareness of the range of additional benefits around biodiversity and ecosystem services that SRC can provide alongside woodfuel production. Full recognition of the benefits could then help create a more level playing field between potential solutions, for example by enabling energy crop growers to access similar benefits to those afforded to woodland creation, or by recognising the impact of fuel cost (in comparison to other renewable resource types) under the Renewable Heat Incentive (RHI).

Who should take this forward?

Government departments such as DEFRA and DECC, whose remit may be cross-cut by the multifunctional uses of SRC, need to collaborate and support this evidence base review and cost/benefit analysis of SRC roll-out. This would likely involve affiliated organisations such as the Environment Agency, Natural England and the Forestry Commission, and would seek to achieve recognition and acceptance of research outputs that demonstrate the multifunctional environmental and socio-economic benefits provided by SRC.



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Policy brief | 2 of 4

Enabling short rotation coppice harvesting, storage and processing infrastructure to supply local heat markets

Policy recommendation summary

Dedicated funding should be made available on a regional basis for harvesting machinery, local processing/storage depots and associated infrastructure for woodfuel production from short rotation coppice (SRC). Potential sources of funding and support include grants from the Rural Development Programme for England (RDPE) and the European Strategic and Investment Fund (ESIF).

Local Action Groups (LAGs) have potential to secure funding via LEADER-based delivery of Rural Development Programme grants, while Local Enterprise Partnerships (LEPs) also have potential to channel RDPE funding to this effect. LEPS can also choose to direct a proportion of their ESIF funding into LEADER projects. All these groups, along with local authorities, could compliment this funding through active encouragement of producer groups and co-operatives, and by helping to identify local woodfuel heating markets, particularly in off-gas areas where the multifunctional benefits to the local community of growing energy crops can be maximised.

What's the issue?

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In many UK regions local infrastructure does not exist to harvest, store and process biomass produced from energy crop plantations. Locally-available infrastructure such as harvesting machinery and woodfuel depots for processing and storage is essential to provide woodfuel at an acceptable standard for the smaller-scale local heat market; that is, correctly sized woodchip with a lower moisture content (which infers a higher market value). Research by the Energy Technologies Institute indicates that short rotation coppice (SRC) used to supply local heat markets can provide up to five times the net profit margin per hectare compared to that from high moisture content, freshly harvested energy crops supplied to the larger-scale power plant market. With

the right infrastructure it is possible to process SRC into high quality, boiler-ready wood chip to supply local markets. However, small producers currently lack these facilities as bespoke SRC machinery and infrastructure is expensive and it is difficult to justify private investment when markets are not yet fully developed.

How could this be tackled?

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Funding needs to be made available for specialist machinery to harvest the SRC crop and to establish woodfuel depots to amalgamate and process SRC feedstock into the required woodfuel grades. Potential sources of funding and support include grants from the Rural Development Programme, which can, for example, be



Enabling short rotation coppice harvesting, storage and processing infrastructure to supply local heat markets

accessed either by Local Enterprise Partnerships (LEPs) or by Local Action Groups (LAGs) via the LEADER approach. Grants could be allocated on a regional basis to kick-start the sector and facilities could be established in conjunction with local SRC producer-groups or cooperatives to make sure they are put to best use through sharing of equipment between farmers and landowners. Consideration could also be given to the provision of targeted loans and attractive leasing arrangements.

What are the benefits?

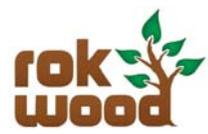
Compared to other European countries, the UK has very low woodland cover and SRC can provide both a short and long term way of boosting local indigenous supplies of woodfuel in areas where woodland resources are limited. If equipment and infrastructure was available on a regional basis then energy crop planting could be concentrated around communities which could potentially benefit the most (e.g. off-gas areas with low woodland cover). Provision of local facilities would also keep a larger proportion of revenue in the local economy.

Additionally, if SRC woodchip can be dried, graded and/or densified locally to where it is grown it would attract a much higher price from the local heat market than if sold freshly harvested to larger power plant markets. This would provide greater income to farmers and lead to more rapid uptake. Facilities to do this, e.g.

local woodfuel depots servicing a 25km radius, could accept fuel directly from the farmer's land avoiding intermediate storage and subsequently minimising yield losses and risk of contamination. This would also simplify the supply chain and make it easier for growers to collectively achieve sustainability criteria; higher quality fuel will produce lower emissions (oxides of nitrogen and particulates) which would maintain local air quality at acceptable levels.

Who should take this forward?

Local Action Groups could potentially secure funding for SRC equipment and infrastructure via LEADER-based delivery of Rural Development Programme grants. Local Enterprise Partnerships also have potential to channel funding to this effect. Both sets of organisations along with local authorities could in parallel facilitate the development of SRC producer groups and co-operatives to help develop the SRC supply chain and also help to identify local woodfuel heating markets, particularly in off-gas areas where the multifunctional benefits to the local community of growing energy crops can be maximised.



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Lowering investment risk for short rotation coppice growers

Policy recommendation summary

The Government should introduce a package of measures designed to lower the investment risk to short rotation coppice (SRC) growers and strengthen the business case. This could include crop establishment grants and some level of guarantee which underwrites interim payments from SRC end users to ease cash flows during the establishment period and to help source alternative end users in the event of one particular market failing.

More generally, farmers could also be offered financial incentives to diversify into growing energy crops through the offer of interest-free loans or subsidy payments for planting SRC where it can make a significant difference to flood defence/water quality.

In the absence of a nationally-run scheme, Local Enterprise Partnerships and local authorities could consider rolling out an equivalent local support scheme making use of local knowledge; for example helping to ensure that if one SRC market failed then others could be identified or developed to reduce risk for growers.

What is the issue?

Despite having numerous environmental and socio-economic benefits, planting short rotation coppice (SRC) is currently unappealing to the majority of farmers. It is traditionally viewed as a high risk, long term commitment with high capital costs, poor cash flow and marginal returns. Under existing economic conditions, most farmers don't recoup the investment incurred during the establishment of the crop until seven years after planting and don't make any profit until they have sold their crop in year 10.

In the past many companies offering SRC purchase contracts have failed or pulled back from the venture before the crop is harvested leaving growers without markets. Previous initiatives such as DEFRA's Energy Crops Scheme have provided 50% establishment grants

but no support thereafter. There were no funds for market development and very little for infrastructure. As a result many farmers are currently without contracts or markets for their crop and some are hundreds of miles from the nearest harvesting machine. Some growers have been forced into removing their crop at great expense. Hence, the current situation is one of too much risk and too little reward for growers. This must change if we are to encourage growers to plant significant areas of energy crops.

How could this be tackled?

Alongside provision for shared infrastructure and stimulation of the market for SRC (discussed in Policy Briefs 2 and 4), a further package of measures could be introduced designed to lower the investment risk to SRC



Lowering investment risk for short rotation coppice growers

growers and shore-up the business case. Initially, such a package would most likely be provided in conjunction with the development of a specific scheme, where one or more end-users are identified and local planting is arranged specifically for this purpose. A support package for the grower could then include crop establishment grants and some level of guarantee which underwrites interim payments from SRC end users to ease cash flows during the establishment period. Involvement of Local Enterprise Partnerships and local authorities could also help to ensure that if one market failed then others could be identified or developed to reduce risk for growers.

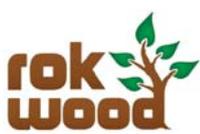
More generally farmers could also be offered financial incentives to diversify into growing energy crops through the offer of interest-free loans or subsidy payments for planting SRC where it can make a significant difference to flood defence/water quality. Another option is the creation of a carbon farming initiative so SRC growers can be paid for the carbon that they offset. Appropriate levels of incentive could be established through the cost-benefit analysis recommended in Policy Brief 1.

What are the benefits?

Improving the business case for investment in energy crop production and lowering the risks associated with lengthy crop establishment periods will clearly make SRC a much more attractive proposition for both existing and potential SRC growers. Combined with the provision of shared infrastructure and stimulation of the market for SRC (discussed in Policy Brief 2 and 4), this will in turn stimulate the market for SRC by instilling confidence in the supply chain and broadening the options for woodfuel end users.

Who should take this forward?

An energy crop support package would ideally be a national incentive scheme with leadership from DECC or DEFRA, although the multifunctional benefits of SRC would cross-cut their remits. Alternatively, regional schemes could be rolled out via Local Enterprise Partnerships and/or local authorities where the benefits of SRC will have the maximum impact, for instance in areas where there is a high proportion of off-gas properties and low woodland cover.



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Matching supply and demand to help achieve economies of scale

Policy recommendation summary

To demonstrate economies of scale, help match short rotation coppice (SRC) supply with demand and to kick-start local production, a scheme comprising one or more pilot projects should be identified and supported which links SRC growers to end-users. This could involve the development of one or more larger scale or several clusters of smaller scale biomass energy installations, both of which would instigate local SRC planting specifically for their own use.

Local Enterprise Partnerships and/or local authorities would ideally co-ordinate this initiative by commissioning feasibility studies to identify suitable locations for pilot schemes, and by facilitating key activities such as the formation of an SRC co-operative or producer group and engaging biomass energy plant developers and end-users of heat.

What is the issue?

At present, there are only a few small-scale growers of short rotation coppice (SRC) located in the south west (SW) of England. These growers are relatively isolated and the infrastructure is not yet sufficient to support the development of the supply chain to a point where economies of scale can be achieved. This means that investment in SRC is not an economically attractive proposition for farmers, and results in a chicken and egg situation whereby there is insufficient supply to create a viable market for the product, and without a viable market there will be little incentive for farmers to upscale production.

Few secure long-term markets currently exist within SW England. Several multi-megawatt projects proposed for the SW failed due to lack of finance and failure to achieve planning permission, however a lot of the energy crops already grown in the area are currently without a market. This sends out the wrong message to

farmers and discourages them from investing in SRC. In fact, there has been very little planting of energy crops in the SW in the last 5 years.

How could this be tackled?

To help overcome the chicken-egg situation, a scheme comprising one or more pilot projects should be established which links SRC growers to end-users. To demonstrate economies of scale this could involve the development of one or more medium to large scale biomass heat or combined heat and power (CHP) plant and/or the development of several clusters of smaller biomass heat installations, both of which would instigate local SRC planting specifically for their own use. This would draw on the initiatives suggested in Policy Briefs 1, 2 and 3 by using robust cost-benefit analysis information to support a business case, helping to justify the investment in SRC equipment and infrastructure necessary to allow the sector to grow and by piloting a finance support package for growers.



Matching supply and demand to help achieve economies of scale

Areas with a high proportion of off-gas communities and low woodland cover (i.e. with a limited local woodfuel resource) could be identified as potentially suitable locations for pilot projects where low carbon and low cost heat could be supplied to end-users to replace costly heating fuels such as mains electricity, oil or LPG. Heat could be supplied via district heating systems where heat loads are sufficiently large and compact.

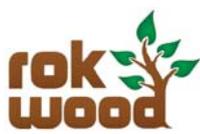
What are the benefits?

The development of pilot projects at a significant scale would enable SRC to be grown where it is really needed and would help to overcome the chicken-egg situation of matching supply and demand. Once economies of scale are achieved growers will have more confidence to increase SRC production, develop their own more lucrative local markets and strengthen supply chains.

In addition to kick-starting the industry, benefits to local communities could be substantial. For example, an energy crops scheme to supply one or more biomass energy plants totalling 83MW heat output would require around 2,500 hectares of SRC; this scheme could be delivered for an inclusive cost of £7.2 million or £2,870 per planted hectare. This could bring about savings of £2.2 million per year in heating bills in off-gas areas. The benefit to the local economy from creation of jobs and lowering fuel costs could be as much as £107 million over the 27 year lifetime of the crops.

Who should take this forward?

Local Enterprise Partnerships and/or local authorities would ideally provide leadership and could be tasked with commissioning feasibility studies to identify suitable locations for pilot schemes which, depending on the scale and type of energy plant, could initially focus on off-gas communities, areas with low woodland cover and the presence of suitable heat loads. They could also facilitate key activities such as the formation of an SRC co-operative or producer group and engaging biomass energy plant developers and end-users of heat. They may also be involved in the allocation of regional or local grants and incentives for SRC production.



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