Tillage Sectoral Energy Crop Development Group

March 2014

Achieving the Potential for Growing Energy Crops on Irish Farms

Evidence and Recommendation Paper:

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FOREWORD

As chairman of the Teagasc Tillage Stakeholder Consultative Group, I want to particularly welcome this evidence and recommendation paper entitled 'Achieving the Potential for Growing Energy Crops on Irish Farms'. The report was drawn up as a follow on action from the Tillage Sector Development Plan, which was drawn up by the stakeholder group in 2012. The purpose of the plan was to identify profitable opportunities for increased markets that exist for the tillage sector and was considered a necessary follow-on to the Food harvest 2020 Report, where specific targets for the tillage sector were not included.

Eight sub-groups, including the Energy Crop Sub-group were subsequently established to develop specific recommendations at both policy and industry level, so as to optimise the development of the sub-sectors and to report into the FH2020 implementation group.

As this report identifies, the energy crop sector is at a cross-roads at present and, while significant potential for expansion exists, the absence of adequate incentives and, more importantly, sustainable markets could effectively kill off the entire sector.

There are many very good reasons to embrace energy crops. On the wider scale we need to tackle climate change by reducing the level of greenhouse gases in the earth's atmosphere. At a national level we need to improve our energy security by reducing our independence on imported fossil fuels. At farm level, an investment in renewable energy can both reduce the high cost of energy inputs and provide an additional source of income for the business.
I want to acknowledge the Trojan work of the Energy Crop sub-group members in compiling this excellent report and hope that this potentially valuable sector can develop to its full potential.

Larry O'Reilly,
Chairman, Teagasc Tillage Stakeholder Consultative Group.

BACKGROUND TO TILLAGE SECTOR DEVELOPMENT PLAN

The recently published Tillage Sector Development Plan will be used as a roadmap for growing the tillage sector and delivery of its goals will be monitored at the Food Harvest 2020 High Level Implementation Committee. The Tillage Sector Development Plan was compiled by the Teagasc Tillage Crop Stakeholder Consultative Group and launched in 2012.
The plan identifies considerable potential for expansion in cereals, oilseed rape, energy crops and some potential in potatoes. If all the potential increases in the various crops were achieved, the area under crops could increase by 221,000 hectares, and the production of tillage crops could increase by 1.14 million tonnes.
The cropped area in Ireland currently extends to 378,000 hectares or 9% of the area farmed. Crop production, including horticulture, contributes €700 million annually to agricultural output. The Tillage Sector Development Plan examines nine crops relevant to Ireland – Barley, Wheat, Oats, Pulses, Oilseed Rape, Energy crops, Potatoes, Beet, and Maize. It identifies considerable potential for expansion in cereals, oilseed rape and some potential in potatoes. The sectoral plan identifies the potential for expansion in energy crops, but highlights that this will depend on an integrated cross departmental range of incentives. The Teagasc Stakeholder Consultative Group established eight sub-groups to help identify how the individual crops could be further developed.

Energy Crop Sub-Committee Members:
Chairman: Tom Bruton, BioXL/Irish Bioenergy Association
Barry Caslin, Teagasc
Roisin Grimes, Irish Bioenergy Association
Eddie Forde, Department of Agriculture, Food & Marine
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Andy Doyle, Irish Farmers Journal
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Bill Madigan, Kilogen
David Tyrrell, Quinns of Baltinglass
Patrick & Peter Farrelly, Willowman
Tony McGuinness, Farmer / Grower
John O'Halloran, Bord na Móna
Geraldine O'Sullivan, Irish Farmers Association
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The committee would also like to acknowledge the contributions from Kevin Lindegaard, and Kevin & Patrick Harley, Donegal Willow.

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INTRODUCTION

Irish agriculture is capable of playing a major role in the generation of electricity, providing fuel for heating and transport from renewables and achieving Government 2020 targets.

Ireland has however been slow to embrace energy crops as a potential solid biofuel resource. This evidence and recommendation paper, together with the main report, outline why growing woody energy crops such as Short Rotation Coppice (SRC) and miscanthus is essential to provide fuel for biomass heat and electricity installations, boost the economy, create 472 new jobs provide additional environmental benefits and meet renewable heat targets.

There are around 3,000 hectares of energy crops planted in Ireland but much of this is currently without a market for several reasons, including proposed projects failing to either get planning consent or financial backing. Teagasc estimates that during 2013 almost 500 hectares of miscanthus have been removed alone. Nevertheless, the government is committed to producing 16% of our total final energy consumption from renewables, which include a renewable heat sub-target of 12% from renewable sources by 2020.

There is an urgent need for long-term sustainable markets for energy crops. Bioenergy can and should play a major role in meeting national energy goals for 2020, but also in looking towards further decarbonisation of the economy post-2020.

Farmers are unlikely to plant large areas of energy crops unless the venture is economically attractive. This is even more critical in terms of increasing prices for milk and beef competing sectors. It is incumbent on government and farming leadership to create the economic environment to incentivise farmers to play their part in achieving 2020 targets.

Identified Energy Crop Priorities for the Tillage Sector

The following priorities for energy crops were summarised based on the discussion of the tillage stakeholder sub-group.

- To provide a viable market for the existing SRC and Miscanthus plantations across Ireland (3,000ha).
- To make energy crops a viable option for Ecological Focus Areas (EFA) for tillage farmers (potential up to 10,000 ha). It is the view of the energy sub group that government should lead with providing the framework both from a market and economic viewpoint.
- To unlock the potentially larger market for up to 67,000 ha of energy crops to meet Ireland's 2020 renewable energy targets.
- To de-risk, in so far as possible, the upfront capital investment in energy crops establishment and handling equipment.
- To provide more stable cash flow to farmers producing energy crops.
- To reduce establishment costs of energy crops.
- To achieve best agricultural practice in energy crops.
- To improve the procurement framework so that local energy crop growers can efficiently supply large energy users, in particular public buildings. The commercial and industrial sector needs to form a key market outlet for energy crops.

The Potential Market for Energy Crops

The national 2020 renewable Heat energy targets of 12%, and further expectations past 2020, provide a market opportunity for energy crops to substitute for fossil fuel use.

Meeting our National Energy heat Targets

Planting just 1.8% of our grassland area pasture, silage and hay land (67,000 hectares) with energy crops could produce 629,800 oven dry tonnes of woodchip per year.

This is equivalent to 39% of Ireland's 2020 renewable heat targets.

This is based on achievable yields of 9.4 oven dry tonnes per hectare per year and assumes good practice on productive agricultural land.

The revision of the Common Agricultural Policy (CAP) offers an opportunity to stimulate energy crop plantings and reward growers for the biodiversity benefits of the crop, by allowing them to be grown as part of EFA. This measure requires farmers to set-aside 5% of their tillage land for the benefit of wildlife. Depending on the financial viability of energy crops, this could lead to up to 10,000 ha being available for energy crop applications.

Particular benefits can be achieved when farmers grow and use their own energy crops for heating their own farm buildings. This would be particularly relevant to the more intensive energy sectors such as poultry, horticultural and pigs, or for local farmers to develop an energy crop supply chain to meet local heat demands. The newly proposed GLAS environmental scheme, funded through the Rural Development Programme (RDP), can further help promote the acceptance of energy crops by farmers.

At present there is no mechanism in place to stimulate the development of supply chains within the agricultural sector, to encourage switching from grassland to energy crops. Infrastructure is badly lacking in order to move harvested material from the field to the furnace efficiently. A Renewable Heat Incentive similar to that introduced in the UK would stimulate the deployment of biomass boilers.

End users, such as local authorities, could be encouraged to procure from local farmers to grow energy crops on their behalf. For example, a typical primary school may need 3-4 ha of energy crops, whilst an elderly peoples (HSE) home may require around 10ha. This presents the farmer with a long term market for his produce. The end user also has confidence in a reliable and secure local supply chain. As the supply is local to the end user, the latter will be insulated against future price rises brought about by higher transport fuel costs. Issues such as public procurement practices need to be considered and ESCO supply contracts may suit public buildings better than purchasing the boilers out-right.

It already makes sense for large end-users who have high oil usage and are off the gas grid to switch to biomass. They lack confidence in an available infrastructural and supply chain system.

Positive Impacts of Energy Crops Development

Below some of the key positive impacts from a broad national policy perspective are outlined. This includes the environmental and economic benefits accruing, as well as the positive role in preventing flooding and improving our water quality played by energy crops.

Ireland is facing a fine of almost €10m per year for not properly transposing the Renewable Energy Directive into Irish law. Energy crops will be an essential component of meeting our challenging 2020 renewable energy heat targets.

Combat Climate Change

Using energy crops for heating reduces greenhouse gas emissions (GHG) by reducing our reliance on fossil fuels. Energy crops store carbon in the soil whilst they are growing.

Growing energy crops on 1.8% of Ireland's grassland area could offset between 566,695 and 811,915 tonnes of CO_2 equivalent per year, depending on the extent of soil sequestration.

This is equivalent to 4.3% of the emissions from agriculture food production. Woody energy crops can help us meet our climate change targets. This reduction figure from agriculture would improve significantly if the off-set due to lesser stock numbers was included in the calculations.

Ireland has agreed to reduce its national greenhouse gas emissions by 20% compared to 2005 emissions levels, by 2020, as part of a the EU Climate and Energy Package for the post-Kyoto period 2013 - 2020.

Energy crops are particularly useful at reducing greenhouse gas emissions. Mitigation is achieved by installing woodfuel boilers to reduce carbon emissions and the crops sequestering carbon in the soil. 54% of our heating in Ireland comes from kerosene oil. Growing 67,000 ha of energy crops in Ireland's grassland could enable the mitigation of 566,695 tonnes of greenhouse gases from kerosene oil replacement and 245,220 tonnes from carbon sequestration. As a result, growing energy crops on 1.8% of Ireland's grassland area could offset 4.3% of the emissions from the agricultural sector. It dos not matter that these reductions will not be directly attributed to the agricultural sector. The main point is that Ireland's overall emissions will be reduced by approximately 675,000 tonnes of CO_2 per annum.

Boost the Economy

Growing 67,000 ha of energy crops would generate an investment of about €200m in the energy crop supply chain. Using energy crops as fuel could save Irish consumers €15 million /yr in fuel costs. A thriving energy crop sector would sustain and diversify rural farm incomes

Wood energy crops can help boost the Irish economy. The 67,000 ha would deliver 278 ktoe of heat energy. This would lead to 0.6 construction jobs per ktoe, or 167 construction jobs and 1.7 operation and maintenance jobs per ktoe, which are 472 on-going jobs. There are no readily available figures for the number of jobs in the propagation, planting and harvesting of the energy crops and the multiplier effect from the socio economic impact of such tonnages of energy crops. Energy crops will be planted mainly on grassland currently being utilised by the less profitable beef sector.

Ireland is 85% dependent on fossil fuel imports. Using energy crops in place of fossil fuels can help to reduce the €6.5

billion currently spent on imports. Oil and natural gas respectively constitute 45% and 30% of Ireland's primary energy mix.

Improve Water Quality and Prevent Flooding

Energy Crops improve water quality and prevent flooding.They provide strips for intercepting diffuse pollutants, such as fertiliser and slurry, before they reach water courses.
Energy Crops slow down run off and intercept sediment thus assisting flood prevention.
Energy crops are multifunctional and could be strategically grown to help improve water quality and provide a low cost form of flood prevention.

In Ireland more than 40 million tonnes of slurry has to be managed. Slurry management can be a challenge, especially in catchment areas to prevent pollution from their land. 100% of Ireland is listed as a Nitrate Vulnerable Zone (NVZ). While Ireland's water quality compares favourably to that of other European countries, we still face big challenges in meeting the conditions of the Water Framework Directive. 29% of water channels and 55% of lake water are not classified as good or high status. Energy Crops should provide an effective local measure for reducing nitrate pollution, by providing barrier strips which intercept sediment and adsorb nitrates from the water.
There are many areas in Ireland classified as high risk to flooding[19]. The coppice nature of energy crops provides good hydraulic roughness, which enhances sediment retention and slows down the flow of flood water. They could therefore reduce the likelihood of floods downstream and increase the time available for issuing flood warnings. Ireland currently spends about €50million per annum on flood defence mechanisms. Appropriately planted energy crops could provide a low cost option for areas that are too small to justify expensive flood defensive measures.

Increase Farm Biodiversity

- At least 12 priority bird species covered by Biodiversity Action Plans are frequently found in and around energy crop plantations.
- Field Margins around energy crops encourage butterfly and other invertebrates
- Woody energy crops can significantly increase biodiversity on farms

A large body of research suggests that energy in general, and SRC in particular, can significantly increase biodiversity on farms. The crop and the surrounding headlands provide food and habitats for birds, butterflies and other invertebrates. Unfortunately, despite the benefits to wildlife there has been no incentive made available to energy crop growers through any of the previous or existing environmental schemes, such as REPS or AEOS.

Land-spreading of sludges and effluents on energy crops

Disposal of the organic fraction of municipal and industrial waste is becoming an increasing problem. Following the ban on dumping at sea, and with the Land-fill Directive curtailing its disposal into land-fill sites, alternative disposal methods are urgently needed. Recycling back to land would have many advantages. But land-spreading, in particular on food and feed crops, does introduce a number of potential problems that need to be addressed before the practice can achieve general acceptability. The main problems relate to food safety, environment and animal health.
In the absence of anaerobic digestion of sludges, the only other option would be to spread them on perennial energy crops, such as willow or miscanthus. This approach would alleviate food safety concerns, but compliance with the nitrate directive on nutrient applications, and with SI 610 and SI 267 in relation to heavy metal levels, would still be essential.
At a rough estimate, the area required for all the municipal sludge currently produced would be about 30,000 ha of land with soil index not exceeding 2. Sludge would provide a source of nutrients for energy crops, such as willow and miscanthus, which do not enter the food chain. The crops can provide a gate fee to farmer growers which help the economics of production. They also provide a solution for local authorities to deal with their locally produced sludge.

The Issue with Sludge on Energy Crops

The EPA are taking the definition of agriculture from that stated in "The Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998" (S.I. 148/1998); this does not include willow as being an agricultural crop.
The Waste Management (Facility Permit and Registration) (Amendment) Regulations 2008. (S.I. No. 86 of 2008) includes sludge spreading to Energy Crops as potentially availing of the relief (exemption) for beneficial recycling. However, the EPA seems to be holding fast and insisting that a "Certificate of Registration permit" is required from the local authority to recycle sewage sludge to willow coppice. This seems peculiar as this document lists, in the third Schedule, Part II, the negated requirement for a certificate of registration for sludge application to energy crops.

The Consequences

Sewage sludge can be recycled to agriculture on approval of a nutrient management plan by the local authority. The application of sludge is governed by Nitrates Directive and the Code of good practice for agricultural use of sewage sludge. It is also covered by The Code of good Agricultural Practice for the protection of soil and water. Each "Certificate of Registration" has an application fee of €300 on top of all the time and work required for its completion. The additional cost makes the recycling of sewage sludge to willow unfeasible.

Summary of Beneficial Impacts

The development of a thriving energy crops sector, would bring many benefits to Ireland. These include:

- Helping to meet our renewable heating energy needs. Ireland has an overarching target to achieve a total final consumption from renewables of 16% by 2020. It has been estimated by DCENR that every 1% shortfall will cost Ireland "between" €100 - €150 million annually. In a best case scenario we are projected to have a 1% shortfall and worst case scenario this could increase to 3%.
- Helping to offset national GHG emissions from agriculture and energy using indigenous resources, which has been a central tenet /driving force in energy policy since the foundation of the state.
- Creating assured local markets which insulate end users from future fossil fuel price rises and provide improved returns for growers.
- Reducing the cost for heating, particularly in areas off the natural gas grid.
- Reducing the dependence on imported fuels thereby increasing security of supply and keeping revenue in the local economy.
- Creating 472 ongoing jobs and 167 jobs in construction. There will also be additional jobs created in propagation, planting, harvesting and transport of biomass for energy.
- Potentially helping to reduce fuel poverty.
- Improving water quality of watercourses and beaches.
- Helping reduce the impact of flooding.
- Increasing the biodiversity of farm land.
- Application of sludge to perennial energy crops, such as willow and miscanthus, in accordance with the requirements of the Nitrate Directive and Waste Management regulations, would facilitate local authorities and provide alternative enterprises for local farmers.

Irish tax system does not recognise importance of Energy Crops

If the expansion of energy crops is ever to take place in this country our tax system will need to recognise the benefits if the desired level of expansion is to occur.

If we make a comparison between Energy Crops and commercial forestry we can see a vast array of differences.

1) In Ireland any forestry managed on a commercial basis is exempt from income taxes for individual or corporations. Since 2007 the exemption has been restricted for individuals. It is now limited to €80,000 per person per annum assuming total income exceeds €125,000 for that person. – The revenue from energy crops is subject to income tax at either 20% or 41% whichever is relevant.

2) Income from commercial forestry including the forest premium scheme is not liable to the training levy or health contribution which is now the Universal Social Charge (USC). Energy Crops are liable to USC payments.

3) The annual premium received by farmers is exempt from income tax. There is no annual premium with energy crops.

4) Commercial woodlands occupied by individuals are exempt from Capital Gains Tax (CGT) on the growing of timber. The underlying land is not exempt but chargeable gains are restricted to the surplus over inflation adjusted costs. CGT is not applicable to a disposal upon death. This would mean that if you sold the land you would pay tax on the value of the trees that were sold with the land. This exemption does not apply to companies. Energy crops do not receive such recognition.

5) Growing timber in commercial woodlands is exempt from stamp duty but the underlying land is not. If you sell your forest the value received for the trees sold will have no stamp duty charged against it. Clarification is needed for energy crops.

6) Commercial woodlands are subject to capital acquisition tax, inheritance tax (CAT) on gifts or inheritance by individuals regardless of the residence or domicile of the disposer and beneficiary. Relief is available to commercial woodlands as an agricultural property. As from 23rd January 1997 the relief as a reduction in market value is as follows: A flat rate reduction of 90% applied to both gifts and inheritance of commercial woodlands. Clarification is needed for energy crops.

Recommendations

To address the identified priorities and help achieve the potential to grow energy crops profitably on Irish farms, the following recommendations are suggested for integration into national energy, agricultural and environmental policy.

- Retain the Bioenergy Scheme to provide establishment grants over a multi-year programme to develop sustainable bioenergy supply. Rather than paying a percentage of the payment, a standardised payment of €1,300 per hectare should be paid. This would eliminate bureaucracy and save time on administration of a Bioenergy Scheme. Applicants must prove the origin of their willow cuttings to ensure grant payment. This could be verified by a certificate from the breeder, confirming that the applicant received the cuttings from an approved breeder.
- The current upper limit of planting 30 hectares under the bioenergy scheme is limiting the development of some projects. This upper limit should be removed.
- Develop annual payments model to improve economics and bridge cash flow deficit in early years of energy crop production. This should match net return from forestry. The annual forestry premium rate for Sitka / lodgepole of €369 per hectare or €149 per acre should be paid for the first three years of energy crop establishment. This is currently not possible under co-funded schemes, with only establishment grant payable. Energy crops should be funded under an energy pillar at EU level to overcome such funding anomalies.
- A capped budget scheme, similar the Renewable Heat Incentive in the UK, should be introduced to stimulate the installation of biomass boilers. Thought should be given to prioritising projects in the most appropriate location. We need to have good pilot projects with a suitable supply / demand balance, where growers would establish crops in a given radius of demand.
- Grant aid should be provided to propagators of energy crop planting stocks, enabling them to multiply stocks with less financial risk and achieve greater economies of scale (which ultimately will lead to lower establishment costs). The stakeholders have identified the costs of developing this side of the willow business.
- Public sector organisations need to look at their own land bank for opportunities to grow energy crops. There should be an obligation on public sector buildings to cut their annual greenhouse gas emissions, through the combined use of renewable technologies and the implementation of energy efficiency practices. Public sector organisations with a land bank could lease their land to a local farmer supply chain group, who are willing to deliver biomass feedstock to the public sector building on contract.
- Energy managers of public sector buildings that already have biomass boilers, or plan to install them, require a procurement framework to engage with local energy crop growers, with a view to setting up a long term supply partnership. This option should be built into the Local Energy Supply Contract models being developed by SEAI.
- Growing energy crops should be supported under the RDP for 2014-2020 GLAS measure, in order to recognise the multifunctional environmental benefits these crops offer. Future environmental schemes should recognise the environmental benefits of energy crops in terms of carbon sequestration, nitrates reduction, riparian zones, biodiversity and improved water quality.
- Energy crops should be permitted as part of Ecological Focus Areas proposed under CAP reform.
- A dedicated grant scheme for energy crops infrastructure and processing projects is required. From 2013-2020 it is estimated that about €3.6 million of funding is required for machinery infrastructure, with €3.3 million needed for processing infrastructure. Grants of initial infrastructure projects should be up to 75% of capital costs and reduced to 40% after three years.
- A modern day definition of willow as an agricultural crop is needed within the '*Sewage Sludge in Agriculture Regulations*' to allow the application of sludge on willow similar to other agricultural crops.
- Improvements in dissemination of information and support will help growers understand the energy crop option that is most suitable for their land, their storage options and the needs of their customers. Growers guidelines need to be updated periodically based on new research information. Standardised contractor briefs should be produced in order to encourage best practice. Training is also required for actors in the supply chain to ensure best practice. In particular, a focus on fuel quality is required.
- The Wood Fuel Quality Assurance scheme (WFQA) should become a requirement of future fuel supply contracts, especially with public buildings or any biomass boilers which qualify for future government supported schemes, such as a Renewable Heat Incentive (RHI).
- A boiler installation scheme would be beneficial in demonstrating best practice for generating supply chains and operation biomass boilers. If correctly managed, such a scheme would instill confidence in growers that there are profitable end uses for their crops. For potential biomass boiler installers, the scheme would illustrate the money saving opportunities of these systems and how they could incorporate biomass to meet their energy needs.

There is a need for centralised depots for farmers to bring their crops to straight from the field. This would negate the need to establish storage facilitates on farms at the expense of farmers. This might be particularly important for when the heat sector develops for these crops, as centralised depots could dry the crops (achieving economies of scale) and have a standardised fuel output.

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