

From: Johnston, Chris
To: ["Alistair McCracken";](#)
[McCracken, Alistair;](#)
Subject: RE: Willow drying
Date: 14 December 2015 20:40:00

Alistair

Here is the text of the press release

7 July 2015

AFBI Research highlights effective approach to drying willow stems

In Northern Ireland, the Department of Enterprise, Trade and Investment (DETI) have set a number of important renewable energy targets, including 10% heat from renewable sources by 2020. As a driver, The Renewable Heat Incentive (RHI) provides payments to help with the economics of domestic and non-domestic installations of biomass boilers. Energy from woody biomass is ideal for heat production with Short Rotation Coppice (SRC) willow being the main renewable energy biomass crop grown in N.Ireland. The Agri-Food and Biosciences Institute (AFBI) has been involved in the growing and utilisation of energy crops including SRC willow for many years. Recent research into the use of paper-based laminate covers to protect stacked harvested willow stems has demonstrated how this simple and convenient method can maximise the amount of energy obtained by reducing moisture content (MC) and conversely increasing the calorific and financial value of the biomass crop.

Growing SRC willow

Willow is planted from stem cuttings and is cut back after the first year of growth to allow extra stems to sprout. The first harvest usually takes place either two or three years after this cutback and thereafter commonly on three year cycles. Harvesting is generally carried out in the winter months when leaves are absent and site conditions allow harvesting machinery access. The rootstock remains in the ground with new shoots re-emerging the following spring. Estimates are that the plantations will have a lifespan of approximately 25 years.

Direct Chip Harvest

There are currently two main harvesting methods used in Northern Ireland, direct chip harvesting and whole stem harvesting. With the direct chip harvesting option, the crop is cut and chipped in a single pass and the resulting material blown into trailers for removal. The moisture content (MC) of fresh wood at harvest is in excess of 50%, so it must immediately either be used in suitable applications or artificially dried following harvest to prevent deterioration due to self-heating, self degradation and loss of calorific value. This can also lead to potential health and safety implications with fungal spore production and mould growth. Dedicated drying facilities are therefore required to reduce the moisture content to below 25% where biomass storage is stable and use efficiency will be high. These drying facilities are expensive and require significant energy inputs.

Whole stem harvest

Whole stem harvesters cut the crop as entire rods which must be collected and removed to storage areas. The stems require handling a second time and are ultimately chipped prior to use. Where possible the stems are stacked, preferably on a hard surface and ideally raised off the ground to allow optimum ventilation and natural drying. Willow harvested as whole stems do not have the same self-heating potential and can be left to dry naturally over the summer period before being chipped. Previous AFBI research has shown that stacked willow stems can dry naturally over the summer months to approximately 25% MC, however during the following winter months a certain amount of re-wetting takes place with MC rising to approximately 30%.

AFBI has conducted trials into the use of a waterproof paper-based laminate cover consisting largely of natural fibre. A very thin plastic layer within the cover makes it both water proof and strong. However due to the characteristics of the fibre cover, it can be chipped along with the residue and combusted in the boiler. The cover shelters the top of the pile leaving the sides open allowing moisture to evaporate. Stacks of two and three year old willow stems were sampled on a two-weekly basis during summer 2014, the following winter and continuing through 2015. Willows underneath the cover became drier than those left uncovered with the moisture content of both two and three year old stems remaining below 25% with no re-wetting occurring during the winter months.

In conclusion

Cutting, storage and covering of whole stems offers an alternative drying approach which may be more appropriate to growers with smaller areas of SRC willow who do not have access to a drying floor. Chip with MC below 25% is stable and will provide a continuity of supply to the end user. The development of low-cost drying systems for willow is one aspect of the development of sustainable quality wood chip supply chains. Use of this type of paper laminate cover appears to provide a viable beneficial alternative method to assist the natural drying of willow stems producing a good quality wood chip.

AFBI Wood Chip Quality Workshop

The quality of wood chip is extremely important in order to maintain a well running biomass heat system. Aspects such as chip sizing, moisture content and ash content all have their parts to play. AFBI will be exploring these aspects and how we can improve wood chip quality in Northern Ireland at a workshop to be held in association with CAFRE, BENI and WFOA at Large Park, AFBI Hillsborough at 1.30pm on 8th September. To register to attend, please call Anne Fisher on 028 3889 2325.

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Personal information redacted by the RHI Inquiry

From: Alistair McCracken [mailto:alistair.mccracken@afbini.gov.uk]
Sent: 14 December 2015 19:59
To: Harry Baxter
Cc: Johnston, Chris

Subject: Re: Willow drying

Dear Harry

You probably thought I was ignoring you - apologies for taking so long to reply - just quite a lot happening in my life just now. I am looking towards retiring from work in the New Year and there seems to be so many things that need clearing up.

I know about the paper type covering that has been used to let willow dry - we have done no work on it but I know the guys in Teagasc, Carlow did try it out a few years ago, with reasonable success. I will contact my colleagues there and see if I can get some more information for you. If the willow is cut as rods it will dry to that sort of level naturally, although you then have the issue of how to chip it.

It will certainly be good if you can start collecting RHI on the 199 Kw boiler in the Castle - that should bring in quite a lot of savings.

I like your idea of planting some willow. There should be some Government establishment support for that in the Rural Development Scheme. Certainly we have just put a very strong case to support that. I am not sure when that might come to fruition. I think I would be going for a bit more than 10 acres (4.1 ha) In the past the planting grant has been for anything over 5 ha. If you were to plant 10 ha there would be some economy in scale for harvesting. Once established if you harvested say 3 ha (3 year old growth) per year in rotation you are looking at a wet harvest of 60 wet tonnes per harvest which will dry to 36 dry (20% moisture) tonnes which will keep some of the boilers going for quite a while. I am very enthusiastic about the district heating system. Is there any opportunity to have your own chip drying facility?

It is hard to see where biomass renewable energy will go in the near future. We certainly feel that it has an important contribution to make.

I am copying into this email a colleague and good friend of mine (Chris Johnston) who also works for AFBI and is much more involved in renewable energy stuff than I am. He may know a bit more about the paper system.

Happy to take this discussion further if you want.

Hope you have a good Christmas and blessed New Year

Alistair

On 26 Nov 2015, at 11:30, Harry Baxter <ceo@centreministries.org> wrote:

Alastair,

I trust you are well.

I recall reading a few months ago about trials with a paper based cover on bales of willow whips achieving 25% moisture content in the field. Is there a paper on this?

We are commencing installation of our fourth system across the group shortly. We have 199kW Chip at the Castle (and a bit of pressure on DETI has resulted in the tariff band being increased to 199kW last week, so we can begin to collect some RHI at last!)

We have just installed 2 x 220 KW Pellet at Cloverley, and 250 kW Pellet/Chip at Quinta (though the store would be unsuitable for chip).

We are embarking on a District Heating concept for another part of the Quinta site which will be 2 x 220 kW and there would be adequate space for a multi-use store.

I have a suspicion that future Govts may try to fund RHI through biomass fuel duty, and I would like to begin producing our own to protect against that scenario. We have 50+ acres at Quinta, and we could probably push 10 into SRC Willow. Accordingly, I am encouraging our Board to install a system (and storage) that keeps our options open.

Your thoughts...?

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Kind Regards,

Harry Baxter

Personal information redacted by the RHI Inquiry

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