

For one Aberdeenshire farmer, a move into renewable energy means grain drying has become a profitable option, rather than an ever-rising cost to the business. Emma Penny reports.

Fresh approach to make a profit from grain drying

Hamish Watson does not mind what moisture content his grain comes in at – in fact, the wetter it is, the more profitable it becomes. It is a completely different mindset to anyone relying on increasingly expensive fossil fuels, and this huge change in approach is due to one thing – the Renewable Heat Incentive (RHI).

In the past, Mr Watson has spent about £15,000 a year on oil for tray drying grain from his 325 hectares of arable land, which is harvested at an average moisture content of 20-22%. Now he is using wood chipped at 1p/kW, a 6p/kW saving on oil. Even better, he is also receiving 5.6p/kW in RHI payments, which are index-linked for the next 20 years. The more he dries, the more RHI payment he receives.

It sounds too good to be true;



The Glenfarrow boiler, with Froeling boiler woodchip feeder shed (right) and tray drier to the rear at Balring.

Mr Watson says it is, and that means the RHI will only be open for a short time. But as long as the scheme is available, he says farmers should be looking at taking advantage of it. "The RHI is just a stimulant to get the market going, so you

have to do it now." Many farmers have been to see his system, and some are now using biomass to heat potato stores and chicken sheds and receiving RHI for doing so.

Potential

Farming just north of the UK's oil capital, Aberdeen, Mr Watson first heard about the potential for RHI at an energy conference two years ago. Now, he has two biomass boilers on farm at Balring, Mintlaw, near Peterhead, and is about to install a gasifier. Currently, the boilers power his 120-tonne capacity tray grain drier as well as heating the workshop, three houses and water for the farm's power washer.

"I first heard about the potential for RHI when I went to the All Energy exhibition in Aberdeen, and then at Cereals, I met a company who were just starting to build and install their own boilers."

That company was Glenfarrow, and Mr Watson says he chose it to do the job as it employed 40 of its own plumbers and could therefore complete the entire process. It also applied for RHI approval for Mr Watson and carries out all his quarterly RHI paperwork for Ofgem too. Six weeks after submitting the figures to Ofgem, the RHI payment is paid by BACS into the farm's bank account.

The 400kW boiler and installation cost £29,000, and was installed by two men over five days in August 2011. The drier was modified by cutting a three-metre by two-metre hole in the back wall of the drier shed and installing a radiator and a fan which draws outside air through the radiator.

RHI applications opened in December that year, and Mr Watson started drying grain using the boiler as a heat source last summer – the first drier in



Hamish Watson is embracing biomass for drying grain at Balring Farm.

Hamish Watson's RHI investment tips

⇒ If you are going to do this, do it now before the incentive disappears

⇒ Secure your fuel source, and make sure it is dry so

it burns well

⇒ Banks now seem keen to finance these systems

⇒ Get quotes from a range of boiler companies



Mr Watson is also receiving RHI payments for drying woodchip for boilers.

the UK to receive RHI. The first year's RHI payment came to £12,500; a massive turnaround from the £15,000 cost for buying oil in previous years. Payback on the boiler is about three years, falling to two years with the RHI.

Mr Watson chose to use timber rather than straw as a fuel. Straw can 'bridge' in the boiler, is difficult to top up and, if it is damp, can be very smoky. Instead, he bought seven artic loads of timber and welded a crate in the farm workshop for bundling together eight 2.1m (7ft) logs. The logs are bundled using rope discarded by the local deep-sea fishing industry, which has the benefit of being free, and this means he can move bundles with the farm forklift into the boiler.

This year, he is drying a batch of grain a day, allowing it to cool at night. Each batch uses three to four bundles of logs, but he admits the wet harvest

last year did mean he had to top up the drier's fire power with oil.

Woodchip boiler

To avoid this being a problem again, and to ensure the farm does not breach its RHI tier break - when the payments fall - Mr Watson installed a further biomass boiler this spring, this time a 200kW Froling woodchip boiler.

The tier break is at 1,314 hours per year, and would see the RHI drop to 2.2p/kWh (payment level is set at the time of his initial approval). The break point is worked out based on an average boiler working 15% of the year flat out, and then drops to a point where the RHI would just cover the fuel used. This is designed to stop people running boilers and just putting heat into the atmosphere.

"We did look at putting another Glenfarrow boiler in, but we clear felled a lot of Spruce



Bundled logs in the empty cattle shed waiting to be fed into the boiler.

trees on farm over winter. We sold the logs but the price for pulp was so poor, we kept 1,000 tonnes of it, got it hauled here and decided to go for a woodchip boiler."

Even the brush remaining after clear felling is used. A self-propelled brush baling machine is hired in, producing about 750 bundles/ha, but it is an expensive process, costing £8/bundle, and so only suitable for 'home-grown' brush, says Mr Watson.

The new 200kW Froling woodchip-fired boiler, including installation and a new shed, cost £100,000. This figure also includes £12,000 for 450m of underground pipe so it could be used to heat three houses,

the workshop and power washer, as well as boosting the grain drier. Each of these has a separate meter installed, which ensures keeping track of the RHI figures is simple. Two of the houses are rented out, and tenants now pay £100 per month in additional rent but have no heating bills.

With automatic feed, ash removal and ignition, the new boiler is easy to maintain, says Mr Watson. He used a contractor to process the Spruce, producing 150-200t of woodchip at a time. It is often damp, and so Mr Watson dries the woodchip in his tray drier - which means he can also claim RHI on drying the feedstock for

his new boiler. In addition, he has been drying woodchip for some local businesses who have installed boilers but have bought woodchip which is damper than ideal; Mr Watson also receives RHI on this.

Drying

Drying the woodchip has not been without its challenges. The drier's current stirrers were not man enough to cope, and he spent a long time trying to obtain more suitable ones. Eventually, he tried a local livestock feed company who specialise in mixing on-farm; he was just home from a meeting explaining to them what he wanted when they called to say they were ready.

He admits if it had not been for the success of his first boiler, he would not have had the confidence to make the much greater investment in the new one. The new boiler, because it

is continuously fed with woodchip, produces a more consistent heat profile, which makes it much more suitable for heating. He cautions that biomass is also better for tray driers than continuous flow because of the variability. "We were fortunate we had the tray drier already, and it was easily converted."

To date, he says he has not experienced any major problems, but admits he has spent 'a lot of time' thinking about the systems and getting them right.

There is a cost to the felling, chipping, bundling and establishing some hard-standing to store the logs. He also plans to put in a new shed to hold dried woodchips. However, it is easy to plan investment when the RHI is index-linked for the next 20 years. Even if the price of timber doubles, drying costs will still be far lower than using fossil fuels.



The original boiler is fed with bundles of logs produced at Baling.

The woodchip gasifier will complete the current line-up at Baling, and should be on-farm this month. He plans to use an old tub feeder wagon to feed it woodchip on a continuous basis, with the output driving a 100kW generator, allowing elec-

tricity to be exported. He will claim Feed In Tarriff on the electricity and RHI on the engine heat produced, which will be used in the tray drier. "It will be the Holy Grail if we can get it right. We hope to have it up and running in the New Year."

Biomass: Relative costs

Fuel	Price per unit	kWh per unit	Pence per kWh
Log wood	£50/t	4,100kWh/t	1.2p
Straw	£75/t	3,500kWh/t	2.1p
Woodchip	£80/t	3,500kWh/t	2.2p
Wood pellets	£180/t	4,800kWh/t	3.3p
LPG (bulk)	42p/litre	6.6kWh/litre	6.4p
Kerosene	65p/litre	11.8kWh/litre	5.5p
Electricity	12p/kWh	1	12.0p

Source: SAOS

Renewable Heat Incentive (RHI)

Technology	Scale	Tariff (p/kWh)
Small biomass	<200kW	8.6p*
Medium biomass	<1MW	5.0p*
Large biomass	>1MW	1.0p
Small GSHP**	<100kW	4.8p
Large GSHP**	>100kW	3.5p
Solar thermal	<200kW	9.2p
Biogas	-	7.3p

*Tier 1 payment 1,314 hours, 20 years RPI

** Ground source heat pump.

RHI tariff for new applications as of 1 July 2013. Source: Ofgem

The economics - grain drying at Baling

► Drying 100 tonnes of grain would take 1,000 litres of gas oil @70p/litre = £700, or £7/t

► Using biomass, 100t of grain would require 2.5t of wood @ £50/t = £125 or £1.25/t

► Biomass saves £5.75/t, and with the farm drying 2,100t/year, saves £12,075/year

► Little sensitivity to wood price changes; even at £100/t, saving is £9,450 compared with oil

► Drier throughput of 100t in 18 hours, so operates 378 hours/year

► RHI payment on 378 hours @400kW @5.1p/kWh (tier 1) is £7,711, index linked for 20 years

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