

# Balring Farm: Biomass and Gasification



*Balring Farm*

*Mintlaw*

*Peterhead*

*AB42 4JN*

*Farmer – Hamish Watson*

*Date of Event - 27 October 2015*

Hamish Watson has installed Scotland's first on farm woodchip gasification plant to produce heat and electricity, he also has three woodchip boilers at Balring farm.

## Background

Balring Farm extends to 360 hectares of arable land. The farm also supports 100 suckler cows and a 100 acre wood which is located approximately 2 miles from Balring Farm. Since the last visit in November 2014, Hamish has installed a 950kW biomass boiler and two 600 tn drying floors as well as a weighing bridge to aid with wood chip business. This is in addition to the existing 200kW and 500kW biomass boilers as well as the 130kWe / 200kWth gasification system. The farm has also expanded since our last visit with 85 acres of arable land for cereals being added.

## Boilers

When the RDI last visited Balring farm Hamish told us that he learnt that woodchip boilers were twice as efficient and half as time consuming as the batch boilers he had originally installed. He still has the 200kW boiler supplying heat to the houses around the farm and the 500kW boiler that is connected to a drying floor but since that visit Hamish has installed a 950kW Kalvis boiler. The boiler supplies heat to two 600tn drying floors that are supplied heat via a central tunnel that is powered by two 30kW fans.

The total cost of the new boiler and drying floor system totalled £450,000. The scheme secured RHI in August at a higher tier of 5.18p/kWh and a lower tier of 2.24p/kWh.

The medium biomass RHI tier is currently set at a higher p/kWh rate than the small biomass tier, resulting in some biomass suppliers oversizing boilers.

The RHI scheme is currently being reviewed by DECC. They are expected to announce in November their intentions for the scheme. Currently it is expected for these changes to come into effect in March 2016.

## Drying Floor

The installation of the new drying floor and biomass boiler has allowed woodchip drying and supply business to expand considerably. Hamish buys his timber from a variety of suppliers including Tilhill, James Jones and Brian Harper. Since the start of the year he has dried over 2,000 tonnes of woodchip.

Hamish dries his own grain in the drying floors. Having a drying floor heated by biomass allows him to harvest at the time that suits him best, without having to wait for a dry spell. The end result of this is a better quality grain, which Hamish can achieve a higher price for, as well as avoid substantial drying floor prices. Previously he was drying grain using an oil fuelled boiler and spending approximately £15,000 on oil annually. Hamish is currently felling the woodlands which he previously bought in 2014, from which the small round wood will be used for chip.

## Gasification (130kWe/200kWth)

### Gasification

Gasification is the process of converting carbon based products such as coal, biomass and petrol into carbon monoxide and hydrogen. This is done by creating a chemical reaction between the product and an amount of oxygen in a gasifier to produce a gas mixture known as synthetic gas, or syngas.

The gasification unit at Balring came about from various personal connections bringing together Hamish who has an interest in biomass and the space to install a system, with Duncan Paterson and Garth Way of Biosus Energy who have the technical expertise in gasification but needed to develop a prototype to advance their company. The project is owned by a joint venture between Hamish, Biosus Energy and other parties.

The scheme has secured 2 ROCs per MWh for the electricity produced and the RHI at 7.6 p/kWh for the heat.

Last year the main objective of the project was to improve the quality of the syngas being produced by minimising the particulate matter (PM). This has been achieved by upgrading the cyclone filter located after the heat exchanger which is immediately after the gasifier.

In addition Biosus Energy has fitted a new line of filters so they can change the filters without having to stop production of syngas. They have also added a chiller that condenses the water in the gas. This lowers the syngasses water content and improves the running of the engine.

The system can currently comfortably run at 100kWe (electrical capacity) and 180kWth (heat output). As the scheme is the first of its type in the UK there are expected to be some further adjustments to be made to optimise the system. The aim is to have the scheme running between 6,000 and 7,000 hours per year.

Biosus have also been commissioned to install two 45kWe at a nearby farm. These smaller systems have a faster install time of 14 weeks. The 45kW units are more sensitive to the moisture of the wood fuel which is required to be under 10% (wb)<sup>(2)</sup>.

For the 45kW system a G50-chip is used. The species of the tree has so far not affected the performance of the scheme but it is preferable to work with one species to help achieve a consistent feedstock.

The amount of room one of these smaller units requires is 12m by 2.5m with the height of the gasifier at 2.5m;

making the system much more compact than its big brother at Balring.

Biosus Energy report that the capital costs for the gasification system remain much the same as last year; these are detailed below, based on two operational scenarios.

### ROCs available for Gasification

The value of ROCs have averaged £42.12 from April 2014 to April 2015.<sup>(1)</sup> Gasification currently qualifies for 1.9 ROCs. This is due to be reduced to 1.8 ROCs on the 1 April 2016.

The ROC's available for gasification over the next two years are:

April 2015 to April 2016 – 1.9 ROC  
April 2016 to April 2017 – 1.8 ROC

## Theoretical costs and returns for the Gasifier system at Balring

	83% Capacity Factor	50% Capacity Factor
Capital Cost	£500,000	£500,000
Heat Generation	1,454,160 kWh	876,000 kWh
Electricity Generation	887,037 kWh	534,360 kWh
RHI Income (@ 7.6 p/kWh)	£67,415	£40,611
ROC Income (@ 9 p/kWh)	£79,833	£48,092
Heat sales (@ 6 p/kWh)	£87,250	£52,560
Maximum Electricity Export (@ 4.77 p/kWh)	£42,312	£25,489

Tom Black (Forestry Manager, Savills Smiths Gore)

'In many areas the biomass market is now holding up the bottom end of harvesting revenues and is allowing work that would once have been uneconomic to go ahead.'

### Reference / Notes

- (1) <http://www.epowerauctions.co.uk/erocrecord.htm>
- (2) wb – Wet Basis



If you are considering biomass make sure to do it before the end of March 2016 while the RHI exists in its current form.

*Hamish Watson, October 2015*

