

Highfield Farm is a 118 acre organic mixed farm in the village of Topsham, on the outskirts of Exeter, Devon. It is farmed by Ian Shears and his family. Enterprises on the farm include a beef herd, sheep, cereals, hens, a campsite, offices and facilities for educational visits for schools. The farm has been in organic certification since the late 80s, and is in Higher Level Stewardship. Mr Shears has installed 10kW of solar pV on roofs across the farm and his latest project has been to install a biomass boiler and heating system to heat the farmhouse, offices and classroom buildings.

System design and boiler specification

The biomass system was installed last year using Exeter based company Fair Energy. “We looked around for quotes, and theirs was the cheapest; it was an added bonus that they were also just up the road” Mr Shears explains. “Before we decided to install, I went to visit a number of working boilers to look at how others had designed their systems and what fuel they were burning. It was good to go and see what others were up to, whether there were any common problems and get a general understanding of how to design the system before we started.”

When designing the system, again doing your homework, will help. “The installer provided us with the location for the boiler; however it was down to us to design the system layout. The size of the chip store, its location and how the fuel is going to be delivered into the boiler all needs thought.”

When looking at sizing the boiler, the family looked to include future developments in the heat load demand. “We are planning on converting some more buildings into offices and want to put hot water facilities into the campsite so we deliberately planned the system to deal with a much higher heat load than we currently use.” The boiler that was installed was a 90kW ETA boiler which replaced the existing natural gas boiler that had previously heated the house.

An under floor heating system was also installed to the classroom facility. Ian didn’t have any preconceptions about a particular brand of boiler but the build quality was important.



“Ultimately we were flexible on the make. I went to see a few but decided on the ETA. It had a substantial auger. As a farmer I like to see things that are well built and of good quality as it has to last at least 20 years. One of the advantages of this boiler is that it has a guillotine mechanism on the end of the auger to chop up any big bits of wood that have entered the fuel store so as not to block up the feed auger”. Ian has kept the existing gas boiler as a backup although so far it hasn’t had to be used as there haven’t been any breakdowns in the new system.

Fuel source and type

When looking at a fuel type there were various considerations. *"We quickly decided that a boiler that needed logs as fuel was not for us,"* Ian explained *"As manually feeding logs into the boiler would involve a lot of time, and I would have to be there every day to reload. We decided that a system that fed in the fuel automatically would be the way to go. We settled on woodchip as a fuel type to start with however we wanted the option to vary this later on and so this was another consideration when looking at boiler type. We wanted one that in the future we could potentially burn miscanthus in."*

At the moment fuel is sourced externally from a company in Okehampton in the form of woodchip from recycled pallets at a cost of £65 per tonne. Plans are afoot to use the wood on-farm from their coppice and chip it themselves. The boiler is set up to burn woodchip with a moisture content of 30% or below, however there is a degree of flexibility in the system. *"We had a load come in with a moisture content of around 35-40% and I was struggling to light the boiler, we phoned the company and they remotely altered the heat load settings to burn the material."*

Maintenance

The system is self-cleaning and there are minimal maintenance issues, however Ian explains that the key is being proactive. *"Once a week I scrape any ash or dust off the fire box and look at the heat exchange pipes to make sure that there isn't any soot building up."* The self-cleaning mechanism removes any debris that may occur in the pipes and there is an automatic ash removal auger.

Ian does recommend vigilance if you are burning different materials though, *"Some of*

the set ups that I visited that were burning miscanthus were having issues with the miscanthus gunking up the boiler and so these types of systems might need more maintenance. If we are burning good quality wood, our ash box only needs emptying once a month."

The boiler is controlled via a touch screen panel and the boiler can be remotely operated through the internet. It is also possible to keep an eye on its performance through the computer, and if there are any problems there are text and email alerts that allow you to sort them out quickly.

The set up process went smoothly, and there haven't really been many issues since it was installed. The only issues that Ian has experienced since it was installed are a touch screen that broke which was replaced, and a nail jammed up in the feed auger but it was easy enough to sort out.

Heat, finance and incentives

Traditionally using the old gas boiler, the farm house was difficult to heat and keep warm, however the new boiler has changed all this. *"We have put in the biggest radiators we can find and it still keeps the house warm, we can feel the difference."* Last year the new boiler generated 50,000kW of heat and used 20t of fuel. The maximum output of the boiler is 130,000kW which is reported to use 40t of wood. Last year they spent £1,300 on fuel for the 20t of woodchip they have burnt.

Ian received some help in financing the project from the utility companies and is also registered to receive the Renewable Heat Incentive (RHI) for the heat generated. He explained that the process of applying for the RHI wasn't too bad. *"It is better to do it all in one go, as the website isn't great at saving*

stuff and coming back to it. There are about 50 questions to answer and you need to upload the schematic drawings, the pipe layout plans and where the heat meter is."

One of Ian's top tips would be that wherever possible see if your system can be classified as a "simple" system under the RHI. A simple system is defined by the RHI for metering purposes where all heat in the heating system is generated and supplied within the same building such that there is no external pipework. This means that all the heat generated is metered and you are paid for it. Ian's system at the moment is defined as a "complex" system as the heat is being used in different buildings and the pipework to take the heat to the different areas runs outside.

He explains *"They don't tell you about the heat losses when you set up your system, we estimate that we lose £300 – 400 of heat from the pipes and the buffer tanks, and so it is worth considering when setting up your system. The meters themselves are an added cost; we have to have 4 of them at £500 each. If it is possible to set up a system that is classified as simple you get paid off one meter for the heat that is generated from the boiler and that's it, job done."*

System performance

Ian is happy with how the system is performing, and if he was installing again would probably do the same. *"I think that we have chosen the right size boiler and chip store, and it is working well. I am more knowledgeable about how the whole thing works now and as such in the future I am looking at whether I can get the system reclassified as a simple system to reduce the losses, but all things considered it's a good system. Farmers should be reassured that as long as you research what you want to do*

thoroughly, it does stack up both in terms of the economics and environmentally."

Interested in installing biomass on your farm? [Click here](#) for more information and key areas to consider when designing your system.

For more information on managing wood on your farm for fuel [click here](#).