

One farming business in the Scottish Borders has redesigned its approach to grain drying around a 1MW biomass boiler. **Ash Burbidge** and **Toby Whatley** report.

Biomass grain drying offers cost savings

Growing a significant area of combinable crops in the Scottish Borders will always involve some catchy weather and less than ideal cutting conditions.

To address this, Mountfair Farming uses a mixture of drying systems across multiple sites to achieve the 14,000-tonne capacity it needs.

Aidan and Jorin Grimdsdale know the challenges only too well, but it has taken a while to get to the point where they are now comfortably able to handle all that the elements can throw at them.

Aidan says: “For years we have focused on having enough drilling, spraying and combining capacity because without those vital tools you have got nothing ultimately.

“Being a relatively young business, we had to make do with what we had in other areas, particularly with our drying and storage facilities.”

The solution to the storage and drying challenge got



The main store at Mountfair Farming dries 10,000 tonnes of cereals and oilseeds annually.

underway in 2015 with the construction of a new 30 metre x 72m building, which was extended further in 2021 to 30m x 102m.

In addition to two 700t drying

floors, there is also a 2019 48t Opico 4810 Magna batch dryer, which has recently been re-sited to its permanent position.

Combination

The storage site is one of four grain stores with Opico dryers operated by the business.

The site utilises a 1MW biomass boiler as its main heat source to dry a combination of crops. The business harvests around 14,000t of crops including oilseed rape, wheat and oats per year.

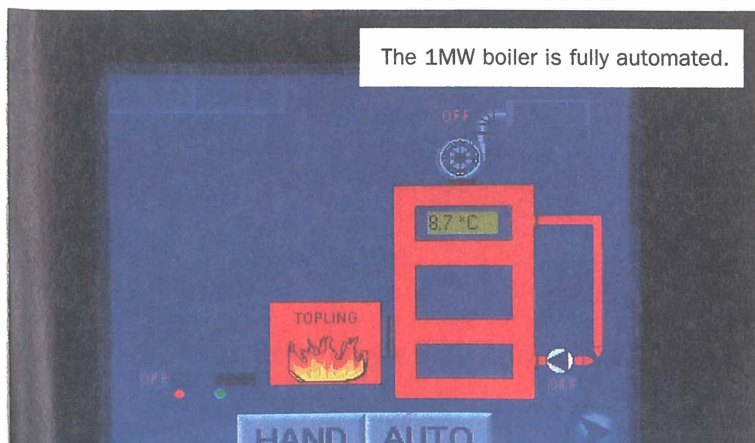
The dry weather this harvest has meant the business has only dried 3,000t, which has resulted in a huge cost saving.

Aidan says: “It has been one of the driest years anyone can ever remember. We do not normally manage to cut wheat under 15% moisture.

“This year we were cutting day after day at 12-13% all day long.”

The Opico 4810 unit is a conventional diesel-fired model operated in combination with a heat exchanger fuelled with

The 1MW boiler is fully automated.



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hot water from the main biomass plant.

Positioned about 60m from the main boiler, an additional insulated pipe circuit has been installed to bring the hot water to the dryer-mounted radiator.

The hot water is pumped through a large radiator mounted on the air intake for the dryer, lifting the air up to 55degC from ambient before being blown in. The diesel burner then lifts the air temperature the remaining 45degC to the 100degC target operating temperature.

The process of pre-heating the intake air has allowed for a more than 50% reduction in the diesel requirement to run the unit.

"Most of the time it runs on the low flame, except on colder nights when the high flame is switched on too," says Aidan.

"Initially we had some challenges in setting up the diesel burner, as the set up required some unusual nozzle jets. Originally even the low flame was burning far too hot, however, once that was sorted and set up correctly it works well."

Included in the assembly is an automated valve which diverts the water flow once the dryer burner cuts off during the cooling cycle. The addition of the radiator has increased the cooling cycle by 25-30 minutes as this must be cooled down before cooler air can be pushed through the grain.

“The cooling cycle is longer, but this is fairly consistent so we factor this in when running the plant

AIDAN GRIMSDALE

"The cooling cycle is longer, but this is fairly consistent, so we factor this in when running the plant and the time it takes to run a batch through the dryer," Aidan adds.

In terms of operating costs, using the biomass boiler to pre-heat the air has made a significant difference to the cost per tonne to process the crop, although costs have increased as a result of the higher diesel price.

Diesel prices

"So, instead of being £2.50/t we are back up to £5.00/t, almost like when we were just running straight fuel; this is because diesel prices have doubled," says Aidan.

However, other adjustments have been made to improve the economics of using the Opico dryer, he adds.

"We have also managed to reduce our electricity consumption. Because we do not currently have a meaty enough three-phase supply to run the



A hydraulically-operated walking floor pulls material towards the intake auger.



The radiator heated with water from the biomass plant pre-heats the intake air to 55degC.

dryer we have been reliant on a generator.

"It requires an inverter which has enabled us to tweak the drier fan. Rather than running at the standard 50 Hertz, we have reduced it to 40Hz.

"The downside of that is we have to run the dryer slightly slower – it is 10-15% down – but it means we have halved the generator fuel consumption. That reduction in capacity is a penalty that is well worth paying – the whole set-up is now so much more energy efficient,

"Electricity price increases have not as yet affected us because we're still in contract until the end of this month [September] so we are still running at 18p/kWh," says Aidan.

The biomass source previous-

ly was windfall softwood which is bought round and chipped on-site as required by a specialist contractor.

This year they have managed to source most of the softwood on farm due to Storm Arwen that came in last November.

"Lots of the wood that has been used this year has been our own wood that we chopped up and got the chipper in for. There was an abundance of wood on the Scottish Borders as we got really hammered by the storm.

"We use roughly 300t of dry chip a year, but that does vary a bit depending on our intake source," says Aidan.

"Usual moisture content for the chip is 20%. We have had it as low as 18% and as high as 23%. Obviously, the wetter the chip,

“It has totally revolutionised the job so that it will process 150t without anyone going near it

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the more we use.

The price of woodchip has not moved much, adds Aidan.

The biomass plant supplied by Topling is automated and controlled through a central touch-screen.

A hydraulic walking floor

pushes the chips into the boiler intake auger, which regulates the fuel input based on the demand from the system.

The boiler is aligned to a Renewable Heat Incentive scheme, so the capacity and its use to dry grain and a small amount of firewood on the drying floors are matched to optimise this system.

The dryer, elevators and store handling are all automated through a central control, linking the demands of the dryer and the output of the dried crop.

A recent installation of a large wet pit has allowed more utilisation of this system, reducing the labour requirement to operate the plant.

Aidan says: "For the first two seasons we had the 48t set-up

outside with a 25t bin feeding it, but it meant having someone on hand all the time to keep it running at full capacity.

"Last winter, the store was completed, the dryer fully integrated, conveyors installed, and a 300t wet grain bunker installed with a proper trench intake conveyor to keep it constantly fed.

Revolutionised

"With it wired into the dryer's touch-screen computer, it now loads and unloads itself under its own steam.

"It has totally revolutionised the job so that it will process 150t without anyone going near it. I can now load up the bunker at 11pm and leave it running all night.

"Dropping 17% moisture grain down to 14.5%, will take about three hours per batch, doing three batches before it needs any attention."

In the two seasons that the Grimdsales ran the 48t drier in its temporary position, with the 25t intake bin, it required someone on-site all the time it was running, loading the hopper and managing the dryer's discharge.

That often meant it might sit idle through the early hours of the morning until someone arrived to start loading it.

With the addition of the 300t intake bunker and some changes to the store discharge system, Aidan estimates that the requirement for human input has been reduced by an average of six hours every day.

Aidan Grimdsdale