

Case Study: 60kW Multifuel Boiler Near Northleach

Key Points

- Corn, woodchips, pellets and others can be burnt
- £7,300/year fuel saving
- On-farm production and processing of fuel
- 45 tonnes of fuel/year
- Installation date 25/9/08
- Heat meter installed to measure boiler output
- Availability of waste corn defined purchase of Reka system



The 60kW Danish boiler installation, with hopper fuel store

Multifuel boiler differences

Multifuel systems are similar to woodchip boilers, but designed to cope with the difficult ash and variable moisture contents of a variety of fuels. Compared to wood, corn has an ash that melts at a much lower temperature. This can result in molten ash that then solidifies (clinker) and blocks the fire chamber and its de-ashing system. This boiler uses a 'moving, stepped grate' to steadily dry the incoming fuel, then break-up the ash, ready for the automated de-ashing system that augers the spent ash into a side bucket.

Fuel options

Un-wanted corn, wood chip, miscanthus, poultry litter and others can be burnt. The boiler controls can be set to optimise the burn efficiency for the fuel type. So this system gives value to low grade biomass from the farm, without transporting it off-site and at the same time negating the need for importing a fossil fuel like heating oil.

This model is designed for up to 30% moisture fuels, though Reka does offer a similar model to handle fuels from 30% to 50% moisture.

The System

This Reka boiler was installed by Eco Engineering Ltd (who are based at the Greenshop premises) in liaison with the UK distributor J.Riley. A steel box hopper with walking-floor fuel supply feeds an auger supply to the burner. The hopper takes a maximum of 10m³ of fuel which is fed by a tractor front-loader. There is a hand-operated hydraulic pump to raise the hopper lid. The fuel burning process is fully automated as lead by the programmed demand, just like a normal central heating system.

Thermal Buffer tank

The Reka boilers are unusual in that they have a water jacket (330 litres for this model) around the boiler so that a thermal buffer is not required for normal central heating systems. In this case, there are plans to add solar thermal collectors, which do require a thermal store, so a 2,200 litre Consolar thermal store has been installed. This thermal store can satisfy large heat demands at short notice, while the boiler's heat demand is smoothed out.

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Costs and savings

Installation costs of approximately £45,000 covered the hopper, boiler, thermal store, controls, heat pipes, back-up oil boiler and all installation work. A fuel cost of £1,300 is replacing an oil equivalent of £8,600 per year. Four independent heat pipes, with supply and return encased in high specification insulation, have been installed to the farmhouse, workshop, barn (for conversion) and flat.

Environmental benefits

Wood fuel and other biomass from sustainable sources are low carbon fuels. Although combustion releases CO₂ this is offset by the CO₂ absorbed by replanting.

The boiler is equipped with modern combustion controls which ensure that complete combustion takes place, eliminating smoke and minimising emissions.

Learning points

- Plan the heat pipe trenches to incorporate other services to reduce overall building costs.
- Consider using a biomass installation project manager to advise on the many installation options that can achieve the requirement at least cost.

Fuel source

Usually the farm will be using biomass produced on-site. Low value timber will be chipped using a chipper that will be shared by a group of local farmers. Waste grain will also be used. £29 per tonne is the expected cost of the fuel.

Fuel quantity

The estimated consumption is 45 tonnes per year, for when all buildings are complete and in use. Of this, 8 tonnes are expected to be waste corn.

Fuel lighting

Many systems use automated ignition of fuel, so they can stop and restart on demand. This system is a lower cost option that goes into a slow-burn slumber mode when no heat is required. Reka data advises that the burn rate is approximately 2% of 60kW (1.2kW) for this slumber mode. Initial start-up requires manually lighting a small fire in the fire box.



Hydraulic pump for hopper lid



Moving grate in the fire box

Maintenance

Tasks are limited to filling the hopper (once per week in winter), emptying the ash bucket and a monthly brush of the heat exchanger pipes.

Further Information:

Eco Engineering
Greenshop, Bisley, Stroud,
GL6 7BX
01452 772 088

J Riley (Reka boilers)
01603 262 526
www.riley-reka.co.uk

Contact us:

Severn Wye Energy Agency
Unit 15 Highnam Business Centre,
Highnam, Gloucester GL2 8DN

Tel: 01452 835087
renewables@swea.co.uk

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