

Ambitious plans for UK's first on-farm slurry and energy crop biogas generating plant

Exciting opportunities are emerging for dairy producers to utilise their silage, slurry and other organic material for generating on-farm electricity, according to Nuffield scholar and farmer Owen Yeatman. Not only will the farm business generate extra profit but it will also benefit the local and global environment. Mike Green reports.

Removing the smell from slurry; making a valuable fertiliser; producing 'green' electricity for the National Grid; contributing to a reduction in greenhouse gases; heating the farmhouse for nothing; and making extra cash. It all sounds too good to be true. But this is what Dorset farmer Owen Yeatman hopes to achieve at his Lowbrook Farm, near Blandford Forum.

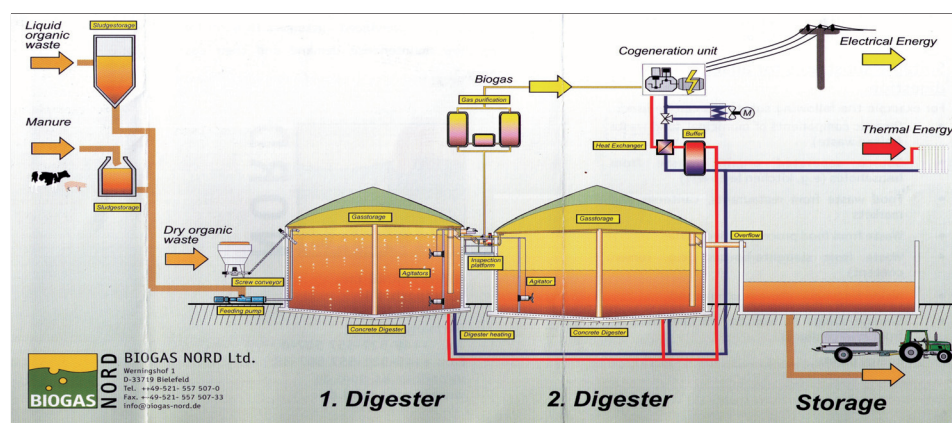
Owen has visited both Germany and the United States to study the development of biogas plants and to see if the technology could be adapted to benefit UK farmers. He is convinced it can be—and has recently been given planning permission to build a pioneering biogas unit at Lowbrook Farm.

What makes Owen's project unique in the UK is that only 20% of the energy production will be generated from manure produced by the farm's 420 dairy cows. Eighty per cent of the energy will come from grass and maize silage specifically grown to 'feed' the new biogas unit.

His unit, which is due to be operational early next year, will have two sealed digestion tanks. Anaerobic bacteria will break down the organic matter in the feedstock—slurry and silage—to produce methane. This will be used to power an engine which produces electricity for on-farm power or for sale to the National Grid. Heat produced by the generator will be harnessed to warm the digester tanks and the farmhouse and dairy. Once the feedstock has been digested, the odourless remains can be



The hopper mixes and 'feeds' silage to the unit.



Managing the unit is fairly straightforward and is monitored throughout by a computer unit. "The digester is just like a big cow's stomach and needs to be fed little and often," says Owen Yeatman. "You need to think of it as a rumen."

Once a day a hopper exactly like a feeder wagon is filled with silage and any other organic 'feedstock' and mixed up. This is elevated into the digester in 20 computer-controlled feeding sessions over a day along with slurry which is pumped in from a separate tank. The substrate then moves into a second tank for further digestion. The first tank produces 80% of the methane and the second tank 20%.

The methane is collected in a bag in the roof of the digester and a steady supply of the gas sent to the generator. "You know how much methane the engine needs and you want constant gas production all the time. There is a 10-hour store of methane in the gas bag but if supplies get low you can give the digester some oomph by adding some rolled barley."

The engine produces electricity and surplus heat can be used for heating the digester tanks and other novel uses.

separated into a liquid for irrigation and solids, similar to manure but with a much enhanced nutritional value, for crops.

"Biogas energy conversion is best done at farm level," says Owen. "It suits small units because you don't want to be carting slurry and silage over long distances. And everything that comes out of the digester can be utilised on the farm."

"This could be a big opportunity for farmers—it is just like having another livestock enterprise on the farm. Instead of turning biomass into milk and meat, you're turning it into electricity. It's a form of diversification. But it appeals to me because it's farm based and avoids me having to deal with the public," notes Owen.

German farmers are already exploiting the technology in large numbers. The country had 2,500 on-farm biogas plants in 2005. This number is currently increasing by 500 a year. "In many cases, German dairy farmers have found that energy production from their biogas plants is more profitable than from their livestock enterprises. Some have even got rid of their dairy

cows and now just grow crops for biogas production."

Owen also has a large arable enterprise and is a board member of Wessex Grain and Green Spirit Fuels, a business producing bio-fuel from grain. All his arable crops go for bio-fuel production. He points out that by the time the biogas plant is built, milk will be the only food he produces from the 2,000 acres he farms.

Owen argues that there are many advantages of biogas over bio-fuel and other 'green' energy sources.

The biogas plant will use the whole crop for energy production and so is more efficient, unlike wheat, oilseed rape or maize in bio-fuel production which use the grain only. The digester can also use any waste organic matter including spoiled silage from the sides of clamps and rations left by cows in the feed passage or feeder rings.

Silage and wholecrop are established crops on livestock farms and producers do not need to learn new skills to grow them. Unlike short-rotation coppice or Miscanthus, the crops for