

Zero Waste Scotland: Article for Scottish Farmer

While farmers in Scotland currently utilise a number of renewable energy methods such as wind turbines and solar panels to help reduce costs and make farms more sustainable, farmers across Europe are also taking advantage of another process which not only produces a reliable energy source, but also has the additional benefit of producing a quality fertiliser as a by-product.

Anaerobic digestion (AD) is a completely sustainable process for waste management on farms and also has the potential to generate income through producing energy and reducing the costs of inorganic fertiliser.

The process involves plant and animal material (biomass) being fed into a digester where, in the absence of oxygen, bacteria in the material breaks it down. A biogas, which is a mixture of methane and carbon dioxide is produced, and can be used to generate electricity and heat to power on-site equipment or the farm's households. Excess electricity can also be exported to the National Grid.

A further by-product of the process is bio-fertiliser which is rich in nutrients such as nitrogen, phosphorous and other elements required for healthy plant growth and fertile soil, and can help farmers save money by reducing their reliance on inorganic fertilisers.

Almost any biomass can be processed via AD, including slurry, food waste, energy crops, manure and crop residues. There is particular interest in using AD to process food wastes as part of Scotland's drive to meet zero waste targets, where only 5% of all waste will be sent to landfill by 2025. Farms which have installed AD facilities can take in waste from other sources to 'feed' the digester, whether from abattoirs or food waste from the hospitality industry or supermarkets.

At present there are 17 AD sites in operation or under construction in Scotland, excluding those used for waste water treatment. This includes nine on-farm facilities, including two which have been designed to take food waste from external sources, as well as on-farm waste such as slurries. These facilities are enabling their developers to reduce their fertiliser costs and even develop products with a wider market. A recent report, *Digestate Market Development in Scotland*, concluded there is considerable potential for the use of bio fertilisers from AD in Scotland.

Creating renewable energy and savings through AD

The family-run Gask Farm in Aberdeenshire knows the benefits of AD and commissioned its digester in 2006. The Weltec Biopower digester provides power and hot water for the farm and, since installation, the farm has reduced its inorganic fertiliser costs by 80%.

Managed by Andrew Rennie, the 800 acre farm works in partnership with local suppliers to 'feed' the 2400 m³ digester it has on site. Local abattoirs and fish processors contribute waste, alongside the slurry produced by the farm's 280 sow herd.

Andrew commented: "The decision to install a digester was based on a mixture of commercial and environmental considerations. At the time it did seem like a big investment, but we saw the opportunities available.

"By using a digester we now produce all of our own electricity, have cut down on our fertiliser costs and have become a more sustainable farm. We're also supplying electricity to the National Grid.

"It makes sense to make use of a waste product that's already on-site. After the slurry has gone through the digester (which takes about 50 days) the digestate that comes out is a more uniformed and easier to spread. The nutrients are now in a more readily available form for the plants to take up. We now have a continuous supply of high-quality fertiliser throughout the year to use on our oil seed rape and cereal crops and we're constantly looking for more ways to get even more value from the digester."

Producing a portion of its own electricity is a benefit for any farm, but there are additional incentives. Under the Feed in Tariff scheme, renewable energy generators below 5MW are offered a payment per kWh produced each year.

Using renewable energy to change the way you farm

Farms like Sorbie's in Ardrossan give a clear idea of the impact that installing an anaerobic digestion facility can have on a farm. The farm uses its own slurry to power the digester and has come up with novel uses for the biogas.

Alan Hogarth, whose family has owned the farm for generations, signed up for a Scottish Executive funded pilot scheme in 2004 which was initially offered to farmers as part of a clean bathing water scheme. However, the commercial and environmental advantages soon became clear to the dairy farmer - he estimates they now save £8-10,000 per year on buying fertiliser now that they have readily available digestate.

“Back then I think most farmers in Scotland were unaware of what AD was, or how it could be used. We’re still behind Europe - if you visited dairy farms in Germany you’d be unlikely to come across one that didn’t have a digester.

“The digester produces biogas, which we use to power a CHP generator and create renewable heat and electricity. All of the energy is used to support the farm, whether it’s our household energy, milk processing systems or to produce the steam which cleans our bottles. We’re also looking into installing some turbines on the farm to complement this - it’s important to us to use clean energy.

“In addition to the energy, we also end up with digestate, which is a by-product really. It’s a great fertiliser. We trialled it on fields against slurry and the difference was incredible. The grass which was treated with digestate had a much faster growth rate.

“We process about 24m³ of slurry each day and it’s all automatic. We have a constant source of gas, we’re saving money on energy and fertiliser overheads and we’re also becoming more sustainable.”

Using AD has also changed the scope of the dairy farm. By creating its own renewable energy the farm was able to consider selling locally as much as possible.

“Three years ago we decided to cut out the middleman and start bottling our own milk and selling everything locally. We found some electric milk vans on ebay and within five months we hope to have these powered completely through the AD process.

“Customers increasingly want sustainable and environmentally friendly farms, so the AD facility is also a bit of a marketing tool. As a farm we have always been interested in sustainability and supplying more of our product to the local community, reducing our carbon footprint. This makes it all the more possible for us.”

To find out more about anaerobic digestion, visit www.zerowastescotland.org.uk.