

Grass is greener with AD

Devon dairy launches anaerobic digestion facility to fuel clotted cream production

Background

Langage Farm was looking for a way to improve the grazing quality of its pasture land. It decided on anaerobic digestion to treat its factory waste and manure, returning the digestate to pasture to give significant increases in performance.

Langage Farm in Devon is a stalwart of the local community. Its ice cream and clotted cream have made it a household name; working as seasonal packers during school holidays has become a rite of passage for local teenagers; and trips to the farm and factory are a regular fixture for schools and business parties. Since it introduced an anaerobic digestion (AD) plant to the mix, the farm has been able to demonstrate its product life cycle, from grazing cows and milking and factory processes, right through to the treatment of factory waste and manure to provide electricity and produce a digestate that boosts the quality of its grazing land.



Langage farm under construction

Why did Langage commission an AD plant?

The drivers behind the commissioning of the anaerobic digestion plant were three-fold: Firstly, Langage was looking for a sustainable solution to improve the quality of its grazing land. It was also keen to reduce energy costs; and to take a more resource efficient approach to the disposal of waste materials from both the farm and factory. By introducing AD, it was able to generate its own power, feeding any excess back into the National Grid, employing the waste heat on site, and spreading the resulting digestate back on the land where it would improve grazing quality in its pastures, and therefore help to feed its herd of 250 cows.

Despite the use of artificial fertilisers, the grazing land had undergone a gradual deterioration in condition which, in turn, affected milk yields. Jones said:

“We decided to go to AD to produce a fertiliser which was still microbially active and would increase the quality and value of our grass. Our cows are Jerseys and Guernseys so they produce smaller quantities of milk than a Friesian. It's very high quality, and high in fat and protein but it's expensive. We needed to find a way of keeping our costs down and if our cows are producing more milk because the grass quality is higher, then we've got extra revenue, and we're not paying £20,000 a year in fertiliser costs. If we can also cut £20,000 from our electricity bill, then the commercials for the factory stack up much better.”

BSI PAS 100

Key to the benefit of using AD digestate on land are its nitrogen, phosphate and potash levels; Jones says that since the nitrogen in digestate is almost all present as ammonium, it is readily taken up by plants. Langage Farm is working towards achieving certification to BSI PAS110 for its digestate – a nationally recognised specification which monitors input materials and the management system for the process of anaerobic digestion. It also stipulates a minimum quality for the digestate, either whole or a separated fibre and liquor. The specification ensures that material produced through AD systems is fit for purpose and is a key milestone in the regulatory process for ensuring that it is no longer classified as a waste material.

From a total capital expenditure of £3.6 million, the Langage facility received £1.2 million in funding from the Environmental Transformation Fund, delivered by WRAP through the Anaerobic Digestion Demonstration Programme. The permitting capacity of the plant is 20,000 tonnes but Jones expects it to operate at 16,000 tonnes; of which 3,000 tonnes will be farm slurry, 1,000 tonnes factory waste, and 12,000 tonnes external feedstock made up typically of food waste.



Langage digestate drying process

[back](#) : [forward](#)

The importance of quality feedstocks

Maintaining consistent feedstock quality and quantity is crucial to operating an AD plant efficiently. Although dairy waste is useful due to its high calorific value, and manure contains beneficial bacteria which stabilise the system, additional feedstocks provide an opportunity to increase biogas yields.

Langage is sourcing additional feedstock from waste management contractors, either from household food waste collection rounds, or from commercial collections. For the farm, this means a guaranteed level of feedstock arriving on-site at a specified time, regular income, and the security of knowing that the material will be arriving without the extra cost and burden of maintaining collection vehicles or employing extra staff.

For the waste management firms, Jones says that once rises in Landfill Tax are factored in, the benefits are obvious; gate fees at AD plants such as Langage's make it an appealing prospect in comparison to sending food waste to landfill. In addition, when working with local authorities, the energy benefits and carbon footprint of the enterprise make it a more sustainable choice than landfill.

Since the production of digestate ranks so highly in the required outputs from the facility, much thought has gone into the application of the product to land and how best to manage the process. Langage has implemented a low energy digestate drying phase which – unlike many other drying methods where nutrients and nitrogen remain in the water fraction – maintains the level of nutrients within the dried product. This is achieved through evaporation, and results in a dry material that is lighter and therefore cheaper to transport than wet digestate. It is also more resilient when applied to soils in wet conditions as it is less likely to be washed away.

“It needs a lot of space but gives us a huge amount of versatility. It's effectively a double-glazed greenhouse, so we can use solar power, and all of our waste heat can also be used in there: even in winter when the sun's not out, the waste heat is pumped through the floor to remove moisture.”

Gary Jones

The future

Safety for the cows is the prime concern, so in order to ensure the removal of contaminants such as plastics that may be brought in with external feedstocks, the plant hosts a complex network of separation machinery both at the front end – prior to material entering the digestion tanks – and within the design of the tanks themselves. Any plastics that are removed during the de-packaging process will be sent for further processing in line with the company's policy of diverting as much waste as possible from landfill.

Jones says the benefits to the farm are already clear – financial stability for the factory brought about by reduced power costs and improved soil conditions, but in the future it aims to set its sights further afield and expand its customer base.

[back](#) : [forward](#)

Feedstocks and
digestate

Case Study

page 3

Background

Why Langage
chose AD

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- www.wrap.org.uk/ETF

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[back : home](#)

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