

## MACHINERY

A farm-based energy from waste development could help to tackle slurry emission challenges and add to income streams, reports Jane Carley.

# Slurry fuels farm energy plans

**E**nergy production is becoming an increasingly attractive proposition for farms, offering a means of becoming energy-independent and a useful source of income.

Emerging Cornwall-based enterprise Bennamann is looking to utilise fugitive methane from slurry to produce liquid fuel and compressed gas for energy consumers and to fulfil fuel needs on-farm. At the same time, developments made to capture the gas will help farmers meet the requirements of clean air legislation by upgrading slurry stores.

With sites at Chynoweth Farm near Truro and at the Aerohub in Newquay, Bennamann also has a trading company for the marketing, sales and distribution of liquid fugitive methane and a useful partnership with CNH Industrial, which as well as manufacturing a production methane powered tractor has also pioneered the development of gas-powered commercial vehicles and engines.

The concept is to install a specially-designed slurry pit cover

on-farm to collect and process fugitive methane from the slurry, with all the technology being developed at Chynoweth Farm. The pit is filled in the usual way, and biogas collects in the first layer of the cover where it is filtered before being transferred to the upper section of the cover for storage.

### Biogas

Once the store is full, an alert is sent to the operator. Further processing (upgrading) of the biogas removes CO<sub>2</sub> leaving the methane ready for use as a fuel, with the potential for liquefaction for easier transport. The gas is collected and aggregated by Bennamann Energy and sold to the market.

Dr Tim Fox, head of corporate communications at Bennamann, says: "The initial model we developed with the full suite of equipment installed on site and is ideal for a medium size dairy unit of around 200 cows.

"This system can then easily be scaled up for larger farms. But for smaller herds, the returns do not justify the investment required to install the processing equipment,

so we have developed a mobile, truck mounted unit which can travel between farms and upgrade the biogas on site. We also engineered the cover to hold a week's production of biogas so collection can take place on a weekly basis."

This scheme is being piloted on six farms in Cornwall as part of a collaboration with Cornwall Council, which has 58 tenanted dairy farms in the county.

A further strand of the relationship with the council provides a ready market for the gas – its vehicle provider Cormac uses gas-powered Iveco trucks and road repair equipment.

The Iveco trucks are currently running on compressed gas, but the liquefaction process is being refined to make the gas easier to transport.

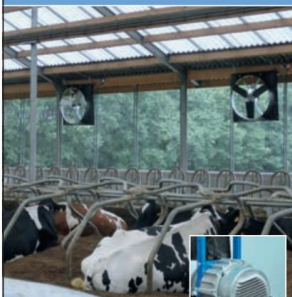
"We have got one farm up and running already and two others are currently having our equipment installed," says Dr Fox.

"All of those in the pilot have slurry pits that were due for upgrading, so it was an attractive and logical proposal for the council."

The process also produces digestate which is biologically enhanced

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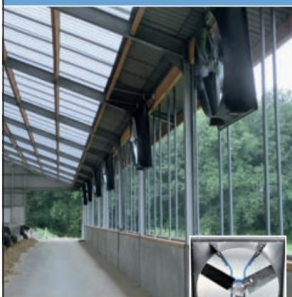


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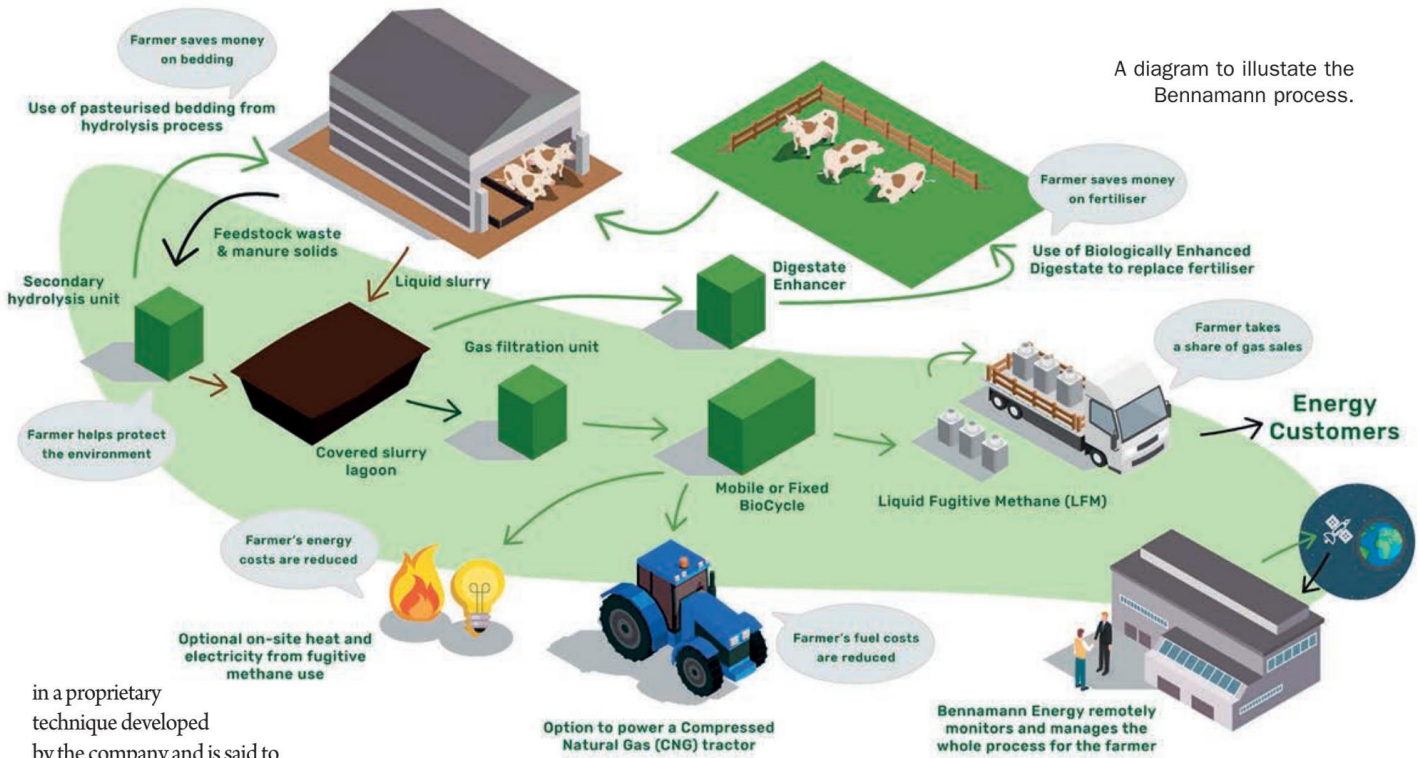
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A diagram to illustrate the Bennamann process.



in a proprietary technique developed by the company and is said to offer better availability of nutrients than the traditional by-product of anaerobic digestion.

Flexible, modular covers are being developed for farms that have slurry storage infrastructure in good condition and where investment in rebuilding the pit and adding the Bennamann system may be restrictive and add costs.

“This highly innovative design uses affordable high tensile strength cabling to maintain the shape of the cover,” says Dr Fox.

“We are looking at ways to cut the cost so that it is closer to the investment for a standard pit cover; a prototype will be tested this year at three privately-owned farms in the south west.”

The process currently uses one sixth of the gas produced to power the plant and equipment. To maximise returns from production, research is being carried out in conjunction with Exeter University to use renewable energy sources to run the system, an approach that will be rolled out on the first of the pilot council farms.

“At Chynoweth Farm, a European Regional Development Fund aided project is looking at how the farm can combine other on site renewable resources alongside gas production to come off the grid and be energy independent,” adds Dr Fox.

The relationship with CNHi –

which took a minority shareholding in Bennamann in 2021 – has given the opportunity to prove the technology alongside the manufacturer’s T6 methane tractor, in trials with Cornish grower Riviera Produce fuelled by methane produced using the system.

### Developing

CNHi’s engine and transmission division FPT is also developing a methane-powered generator for use on farm, leading to another ERDF-funded project – the provision of electric vehicle charging units powered by fugitive methane.

“A major advantage of our relationship with CNHi is their capacity to scale up manufacturing in the way that an SME such as Bennamann cannot,” Dr Fox says.

He suggests that while costs vary depending on the scale of the farm and the amount of work needed to bring the slurry storage up to standard, the payback period is three to six years for a system designed to last 25 years or more.

“In addition to cutting fuel costs and providing a source of income, fuel generation can contribute to the farm’s clean air strategy and enable regenerative farming approaches to be developed. There may also be future funding available from Environmental Land Management schemes in the form of grants from the Slurry

Investment Fund and additional income can be gained from Renewable Transport Fuel Certificates.”

Scaling up the business is the next area for consideration. After the infrastructure is installed, biomethane production would be a ‘hands

off’ operation for the farmer, with automated processing, collection, storage and marketing carried out by Bennamann, so the company is looking at possible franchise models to roll out the system in the long-term.



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