

A boost for the biodigester

Biogas installations for converting manure and green waste into energy have a low return on investment. Researchers in Lelystad are working on improving that situation. The novelty of their approach is their use of agricultural waste.

TEXT ALEXANDRA BRANDERHORST PHOTOGRAPHY AGE

A yellow shovel pours rejected maize, leftover feed and lily waste into a large barrel. The roots and bulbs of the lilies are hanging over the edge. Cylinders mash the mixture to a pulp, which is then carried off through a big tube at the bottom to the ‘codigester’, a dark green round silo underneath which can hold 500,000 litres of material. Iron steps lead to a window at the top of the digester. A glance inside reveals a dark brew reaching almost to the edge. At regular intervals, bubbles burst on the surface of this slurry. Biogas bubbles.

‘The biogas is taken off to fuel the engine in that little building over there, to generate electricity,’ explains Durk Durksz of Wageningen UR Livestock Research in Lelystad, the coordinator of the biogas installation. This installation is the hub of the EnergieRijk project run by Accres (Application Centre for Renewable RESources), a collaboration between Wageningen UR, energy company Eneco and the province of Flevoland. The idea is to opti-

mize the conversion of manure and agricultural waste into usable energy. Initially this is done in the codigester, in which a blend of manure and plant waste from farming is broken down by micro-organisms. The biogas that is generated, a mix of methane and carbon dioxide, is converted into electricity. The electricity from the EnergieRijk biogas plant goes into the net, just like electricity from a field full of solar panels. The heat and waste products from the fermentation process are used for the production of pure methane gas and bio-ethanol, as well as for breeding algae. Bio-ethanol is suitable for use as fuel and as raw material for the chemical and the pharmaceutical industries. The algae can be used as animal feeds and for algae oil and in cosmetics and medicines. The leftover algae then go back into the biodigester.

BIODIGESTERS RUN AT A LOSS

Optimizing the fermentation processes is crucial for professional digester companies. Of the original 150 companies run-

ning digesters in the Netherlands, there are now only 100 still in business, Durksz guesses. It is not an easy market, partly because the co-products needed, such as maize, are expensive. Durksz: ‘In Germany there are 6000 digesters. They are paid extra for their electricity because it is sustainably produced. And in Germany they are allowed to put more agricultural waste products in the digesters, making the process cheaper. In the Netherlands, one fifth of the digesters are viable, while the rest are running at a loss. If you improved the return on investment by just a couple of percent, you would get a long way.’

In traditional digesters, a lot of energy goes to waste, says Durksz. ‘About 38 percent of the energy from biogas is converted into electricity, and the rest disappears through heat loss. In our biogas plant we use the residual heat from the engine to produce bio-ethanol and algae. That means we make use of 65 to 70 percent of the total energy from the biogas.’ The researchers



are also experimenting with preparatory treatments, such as chipping or pulverizing indigestible products like grass and maize straw.

LILY WASTE SILAGE

About six years ago a discussion blew up around the issue of ‘food for fuel’, with critics questioning the use of food crops such as maize and soya as biofuels. ‘We aim to use minimum amounts of food crops. We used to put 50 percent manure and 50 percent maize in the digester; now it is 10 percent maize and 40 percent other products such as grass, fodder waste from the cows and at the moment, lily waste.

Since November 2012, a trial has been running using waste from the flower bulb industry. Burger, a flower bulb firm in Espel in the North-East Polder by the IJsselmeer lake, was looking for a place to get rid of the waste from lilies and tulips. The company was given a grant of 122,000 euros by the province of Flevoland to run trials to see whether waste from bulb cultivation can be used in codigesters.

After the lily harvest in November, some of the waste was ensilaged. ‘Ensilaged products can be used all year round. So that gives you a constant supply,’ says Durksz. ‘We don’t have the figures yet, but I think the experiences have been positive. The first time we saw the product, we were afraid the long roots of the lilies would get wrapped around the pumps or mixers. Luckily that turned out not to be the case, as the roots rot quickly. You can only find that sort of thing out in a field trial – not under laboratory conditions.’ Next summer, after the tulip harvest in July, the researchers are going to try working with tulip waste. ■

www.wageningenur.nl/nl/show/gaswinning-uit-bloembollenafval.htm (in Dutch only)

