European Network for Rural Development

Producing green energy from pig manure

EAFRD-funded projects

BELGIUM

Farm's performance, restructuring & modernisation

Location
Ardooie

Programming period
2014 – 2020

Priority
P2 – Competitiveness

Measure
M04 – Investments in physical assets

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Total budget 646 421
EAFRD 100 000
National/Regional 100 000
Private 446 421

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2016 – 2017

Project promoter*
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Developing a new and practical system to manage pig manure more efficiently, as a means to significantly reduce NH_3 emissions and produce green energy.

Summary


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Despite the importance of the pig production sector in the Flemish economy, very often pig farms operate using outdated infrastructure. This results in significant NH_3 emissions. In this particular case, the farmer wanted to achieve optimal production conditions that would improve the farm's environmental performance.

At the same time, investing in the production of renewable energy would lower the farm's energy costs.

The farmer developed a system to quickly remove and separate the manure from the manure pit of a pigsty. This process reduces NH_3 emissions significantly. The fresh manure is fed into a 'pocket digester' (a small-scale anaerobic digester) and this reduces the NH_3 emissions even further. Then, the manure produces green electricity via a motor running on the gas produced in the digester. It is the first time in Flanders that pig manure is used as an input into a digester.

Results

The investment in the manure pit resulted in a 50% reduction in NH_3 emissions.

The farm produces three Megawatt hours/year (3MWh) and fully covers its electricity needs. The electricity is produced by the 'pocket digester' which has the capacity to produce up to 25 Kilowatt-electric (kWe).

Lessons & Recommendations

- Cooperation was central to achieving this project. There was close cooperation between the specialised builders and the farmer. The farmer was able to acquire expertise from a group of dairy farmers who had already carried out a comparable digester investment on their farms and had worked together as an EIP-AGRI Operational Group.
- Pig manure has a high potential to feed pocket digesters. It appears that it is even more promising than initially thought, from the beneficiary's experience.

* The Project promoter/beneficiary is an EIP-AGRI Operational Group (https://ec.europa.eu/eip/agriculture/en)

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Context

Flanders is a major breeder of pigs but farms often use outdated infrastructure. As a result, the production process results in significant climate change emissions. Furthermore, pig manure is currently only used as an organic fertiliser for crop production. This lack of alternative uses has a negative impact on the amount of GHG and NH_3 emitted.

Bart and Mieke are the managers of a closed pig farm. A few years ago they built a new stable for 5 400 fattening pigs in Ardooie. At the same location they also have their sow shed. They employ one person to carry out the farm work.

Through this project, they implemented a number of investments to improve the indoor climate in the stable, enabling them to reduce the emission of gases and to find a new application for pig manure (electricity production).

Objectives

The aim of this project was to improve the production process of a pig farm, which will also result in better environmental performance. In addition, the project helped to find a new use for pig manure: to produce green electricity and to enable the farm to cover its energy needs in a sustainable way.

Activities

Before implementing this new manure pit system in the newly constructed barn, the farmer installed the system in an existing barn to test the idea.

In this process, the thick manure is pumped into the digester where biogas is produced. In the Combined Heat and Power (CHP) unit the biogas is converted into electricity and heat. The whole process is centrally controlled, from the pumping of the manure to the management of the CHP and the distribution of the heat that is generated.

Much attention was paid to proper construction of the manure pit in the barn. The poured concrete in the pit floor slopes from two opposite directions in order to drain the animals' urine more quickly. Afterwards, the farmer installed the manure scraper system and separately constructed the urine trays. Then, he installed the pipes to the pump pit. Setting up the digester involved the installation of the digester tank, the CHP unit and the entire control module of the digester and CHP. This included the installation of a pump to transfer the manure to the digester.

The works were completed by the farmer, in cooperation with several builders, each of them specialising in different components of the investment.

Main results

The investment in the manure pit of the pigsty resulted in a substantial reduction of the NH_3 emissions. Samples taken show a reduction of about 50%. Two measurements were conducted for one week to measure and log the ventilation rate and the NH_3 concentration in the outgoing air. These measurements were conducted by ILVO, the Research Institute for Agriculture, Fisheries and Food.

Currently, the farm produces 3MWh/year of energy and fully covers its electricity needs. The electricity is produced by the pocket digester which has the capacity to produce up to 25 kWe. In practice, this installation appears to be rather small. There is enough manure produced to feed a digester of 40 kWe. In fact, the farm produces a surplus of energy even though this installation was not dimensioned optimally.

Key lessons

This project is a testimony to the farmer's entrepreneurship to run his pig production in the most sustainable way possible and to his circular thinking regarding converting residual flows on his farm into green electricity.

The project was carried out in close cooperation between the specialised builders and the farmer.

The farmer was able to acquire expertise from a group of dairy farmers who had already carried out a comparable digester investment on their farms and had worked together as an EIP-AGRI Operational Group.

Pig manure has a great potential to feed pocket digesters and it appears that it is even more promising than estimated at the beginning of the project.

The problem with the pocket digester that was installed is that the beneficiaries did not know in advance that it would produce so much foam. This makes its net capacity smaller and the residence time too short. Alternatively, smaller quantities of manure can be fed into the digester. The best solution would be to build a bigger digester, however this is an expensive option.

Additional sources of information

n/a

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