Samenwerkingsverband Regio Eindhoven

Pyrolysis on a farm scale

North Brabant, Netherlands

Overview: Dutch manure policy is about to change. The Netherlands currently imports more nutrients than are consumed and exported. In future, farmers producing more manure than they can use on their own land will have to find a way to process and convert the surplus into high quality mineral concentrates.

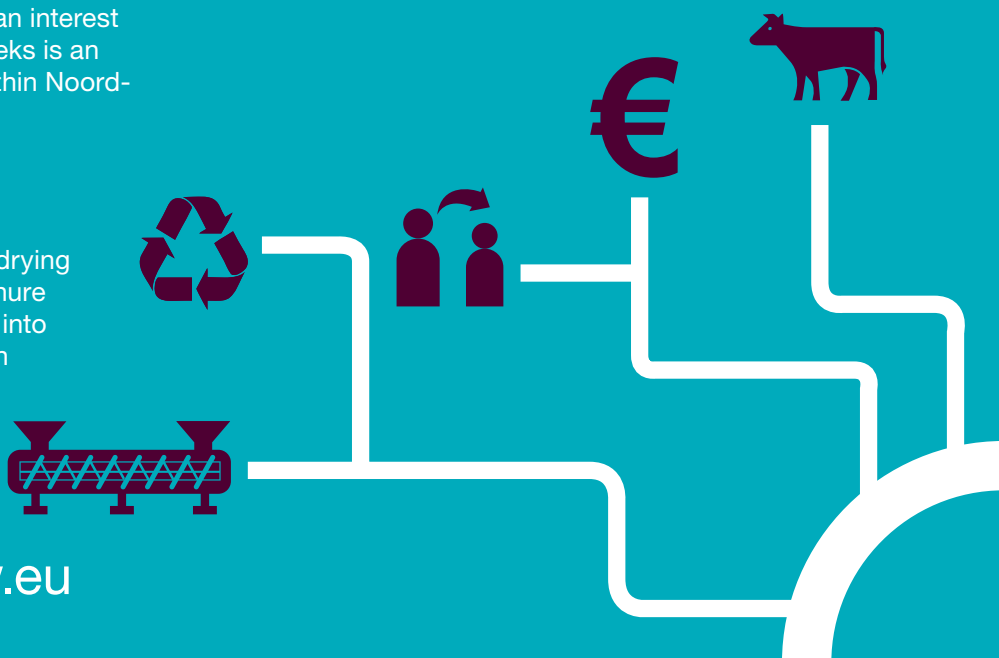
For many years the digestion of manure was seen as a good technique to process manure, with energy produced as a result. However the disadvantages of this technique are its low energy efficiency, the excess nutrients are not reduced, and it is reliant often on subsidies. Pyrolysis offers an alternative, and potentially more effective, technique to produce higher quality products to use in the biobased economy going forwards.

The business case

This initiative was to design and develop a new, economical and ecological sustainable concept for the local valorisation of manure on a farm scale based on the production of renewable resources for the biobased economy. To make the business case as realistic as possible pig farms in the Southeast of Noord-Brabant were contacted. The Meulenbroeks pig farm in Hooge Mierde expressed an interest in taking part in the study. Meulenbroeks is an innovative and representative farm within Noord-Brabant and has 3,000 pigs.

Pyrolysis

The pyrolysis process starts with the drying of manure. It is important that the manure is as dry as possible before feeding it into the pyrolysis system. The investigation showed that drying is an energy intensive process and once the manure is dry, it has to be pelletised to prevent the build-up of dust during the pyrolysis process. In this case, the chosen pyrolysis technology is a Pyroformer™ (a unique intermediate pyrolysis process developed by the European Bioenergy Research Institute (EBRI) at Aston University, UK) whereby dried and pelletised manure is heated to between 400-500 °C without oxygen. The residues from the Pyroformer™ are a solid char (biochar) fraction, a gas fraction and an oil. In this business case the gases are burned directly and no oil is produced because the energy (heat) is needed to dry the pig slurry. The biochar represents a positive value for use as a fertilizer.



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Permits and special integration

The business case research has been conducted to look at special integration, regulations and permits. Currently the biochar can not be classified as a fertiliser but this could change in the future. The processing of a farm's own manure onsite at the farm does not present a problem in terms of permits. As the pyrolysis of manure is an innovative process, research needs to be conducted into the differences between the 'normal' treatment of manure and pyrolysis.
For this initiative the pyrolysis installation will be commissioned at the Meulenbroeks farm in containers which allows flexibility and minimises the cost. The pyrolysis installation could also be moved to another farm.

Profit

Pyrolysis on a farm scale is currently not profitable. To date there is a large quantity of unknown data but there is a good overview of costing for a Pyrolysis system at a farm level. The biggest cost is energy; in particular the energy required for drying the manure. The total cost of treating manure on a farm scale is €96 per tonne of manure. Currently farmers have to pay €15 per tonne to get rid of their surplus manure.

Final conclusion

Technically pyrolysis on a farm scale is possible. The proper definition of biochar for use as a fertilizer and the exact licensing still needs to be clarified. In order to make it more viable a drying technique is needed that requires less energy and therefore less monetary outlay. The study also showed the need to increase the operational capacity of the installation by processing more manure within the same installation.

This development plan has been produced through BioenNW – a €7.9m strategic initiative of the European Union INTERREG IVB North West Europe Programme (2011-2015). BioenNW is led by the European Bioenergy Research Institute at Aston University, UK and sees 11 partners working together to deliver small-scale bioenergy schemes throughout North West Europe.

Pyrolysis pilot plant Harper Adams University

Report issued in June 2013

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