HOW DO WE OPTIMISE BIOGAS PRODUCTION BY EXAMINING EXISTING AND NOVEL METHODS OF PRE-TREATMENT?

The aim of this project "Optimisation of Pre-Treatment Methods for Biogas Substrates" is to investigate the effects of certain pre-treatment methods both existing and novel. Part of the process includes producing computer models based on physical and chemical production variables as well as determining the effects of different microorganism communities responsible for the biogas fermentation processes.

Manure from Danish farms and sludge from wastewater treatment plants is used for producing energy. Fermentation of manure and sludge yields a highly flammable gas called methane. The substrates partly consists of materials that are hard to convert into methane and today even the most efficient methods leave more than 30% of the biogas potential unused. This is mainly due to high amounts of fibrous material, which is not readily available for fermentation. A good example is straw that is part of manure but also used as a supplement for the fermentation of sludge.

The sources of methane in straw are mainly carbohydrates, or sugars, called celluloses and hemicelluloses. These are chemically linked and tightly packed by a complex material called lignin. It is the lignin that hardens the straw and causes access to the sugars to be highly limited.

Breaking down the lignin by pre-treatment can be achieved by different means. Pressure-cooking, called thermal hydrolysis, mechanic maceration and acidic and alkaline liquids are some of the methods already in use.

By developing efficient pre-treatment methods, biogas production efficiency will increase,

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which will lead to biogas becoming financially competitive as a source of sustainable energy. It will also support the Danish Government in achieving its 2020 goal of utilising > 50% of all manure for biogas production as well as its 2050 goal of becoming self-sufficient with 100% sustainable energy.

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