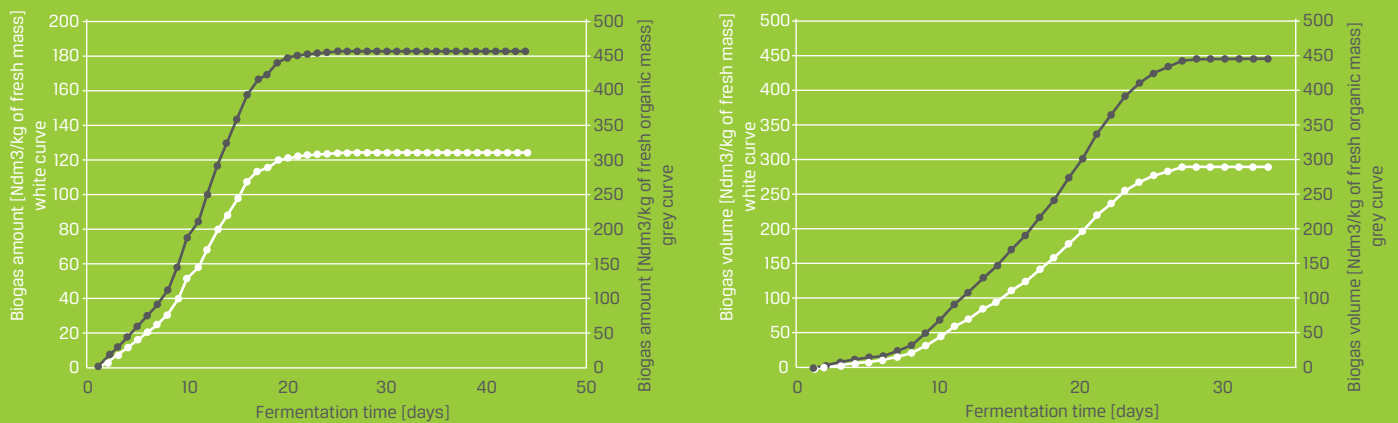




Laboratory



Our biotechnological laboratory is first of this type of research facilities in Poland. Our laboratory was created in 2006 for the needs of studies on optimisation of physico-chemical conditions of methane fermentation based on organic matter from various sources. The results of our studies are also indications for proper control over methane fermentation in large biogas installations.



Curves-biogasrentability of two sample substrates

We work according to standards. Our Laboratory has been created on the basis of instructions of the PN-EN ISO/IEC 17-25:2006 standard. We have research-analytical equipment, which enables us to perform all studies necessary for control and selection of optimal parameters of biogas production. We have i. e. several dozens of bioreactors, an apparatus for nitrogen determination, biogas analysers, a spectrophotometer, GC sets. Most of the analytical methods used in the Laboratory are parts of standards currently in effect. Other methods are own or literature-based procedures. They are a subject to constant improvement and QC.

#### We offer services at all project stages

Our Laboratory is one of a very few sites in Poland, which is able to help you at all stages of preparation or starting a biogas investment:

#### Before the start:

- » we will study the quality of available substrates, determining their basic pa-

rameters (dry mass, nitrogen and carbon content, etc.)

- » we will study the biogas producibility of the raw materials (separately or in the ratio used as a biogas station batch) – biogasrentability study
- » we will optimise the composition and dosage method of substrates mix in a system resembling biogas station processing – quasi-constant optimisation study
- » we will study the composition of obtained biogas.

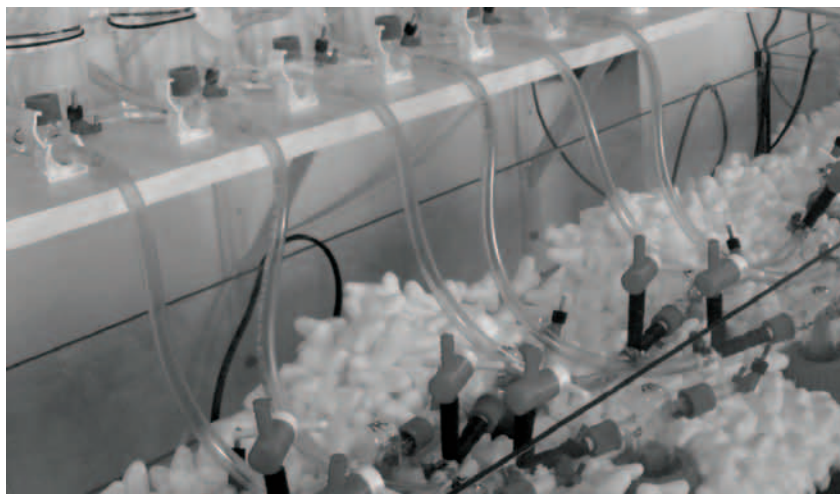
#### After the start:

- » we will monitor the fermentation process in agreed cycles as well as quality of the substrates, detecting any potential problems at an early stage, thus preventing a process breakdown
- » We will study the composition of the biogas, including not only methane, oxygen and carbon dioxide, but also corrosive components, e.g. hydrogen sulphide.

## Our services translate into your results

The process and efficiency of methane fermentation is influenced by several physical and chemical factors. Not only temperature, pH and widely understood quality of chamber batch are important, but also the implementation and execution of the fermentation (one or more steps, dry or wet fermentation, etc.), type of fermentor used, etc. Our Laboratory offers the option of studies on selection of methane fermentation conditions for a particular raw material.

Currently, we are able to simulate the most common types of wet, one- and two-step fermentations on a laboratory scale, with the ability to separate the proper fermentation from auxiliary fermentation, or to introduce a step of enzymatic or physical hydrolysis before the initial fermentation of the raw material. We implement a quasi-constant supply of the fermentors. Our goal is to expand the research and automation base in the laboratory, which will soon enable us to simulate constant fermentation and so called dry fermentation.



Biogasrentability study  
- sounds complicated,  
but it gives us infor-  
mation on how much  
methane we are able to  
obtain from the studied  
substrates

## Laboratory – but what's next?

Starting a methane fermentation process in a biogas station is the very key moment. An improper selection of initial load of the fermentation chamber and lack of control over deposit parameters, such as pH, basicity, concentration and profile of volatile fatty acids, concentration of ammonium nitrogen and temperature – can lead to process breakdown.

In order to prevent this, the ZENERIS laboratory offers its participation in the start of the biogas station, with periodic monitoring of fermentation parameters and proper reaction to changes taking place in the system. In order to ensure a proper, constant level of biogas production, it is necessary to maintain constant quality of fermentation chamber batches. In regards to this quality, we offer substrate studies aimed at their biogasrentability, nutritional substances content and inhibitors content.

Results of such studies are also indications for proper selection and proper dosage of substrates to the fermentation chamber, they also prevent loading the system with harmful substances, which can lead to a total inhibition of key biochemical processes of the fermentation.

## And what after the fermentation?

The post-fermentation deposit is usually used as a fertiliser. In order for the deposit to become usable as a fertiliser, it has to meet some legal requirements. In our laboratory, we study the deposits and their parameters, such as: nitrogen, phosphorus and kalium content, we determine the amount of organic and mineral substances, presence of heavy metals. We control the deposits for presence of pathogenic bacteria and parasites.

We also have the potential enabling us to perform studies on deposits composting, together with structure-forming additives. We are searching for new uses of the deposits, other than composts. We also perform studies on effective water removal from the deposits and on reuse of this water in the biogas station.

## QUALITY POLICY

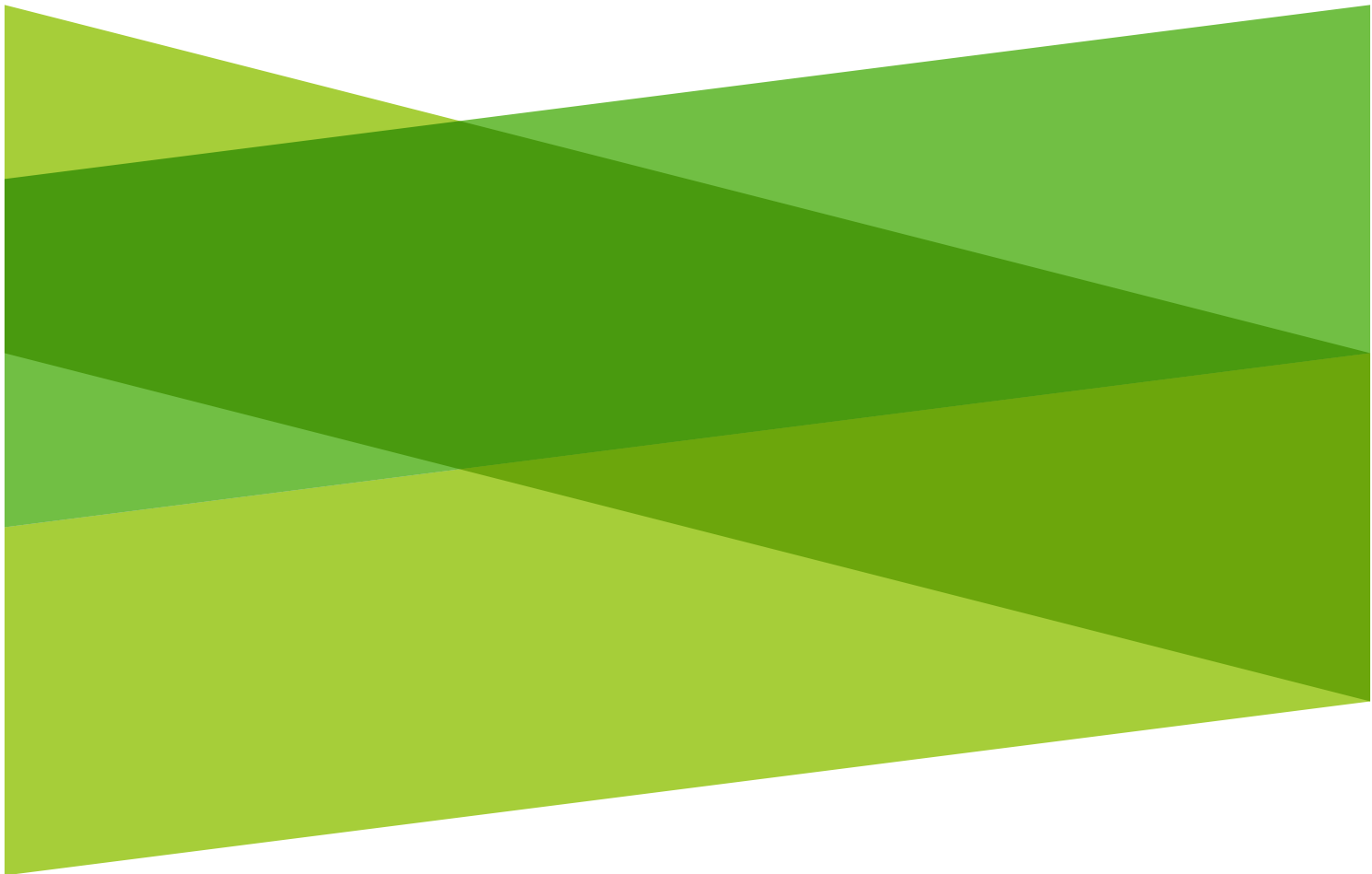
The quality of our studies is one of the priorities of our work. In order to provide the quality, Biotechnological Laboratory of the Biogaz Zeneris Sp. z o.o. company introduces standards of proceeding, which meet the requirements of the PN-EN ISO/IEC 17025:2006

standard (General requirements for competences of research and standardising laboratories).

Our laboratory has introduced the following rules and goals of the Quality Policy:

- » our goal is to obtain and to maintain high levels of quality and reliability of performed studies – we want to gain the trust of our customers related to our objectivity and professional and technical competences
- » we constantly improve our procedures and research methods to keep them updated with the state of the art
- » the execution of all stages of studies and analyses is documented – it ensures their repeatability, reproducibility and their proper interpretation
- » all studies are performed by a team of specialists, qualified in the field of biotechnology and environmental care/ecology





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