

Biogas as a way to attract renewable energy

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The subject of the following article is biogas plant, which is an installation for the production of biogas. Biogas can be used to produce electricity, heat and fuels. Produced by the fermentation of biomass materials that can be used (mainly waste from agricultural, animal and food industry), sediments, sewage treatment and municipal waste lying in landfills. Depending on the type of feedstock used in biogas technology may be different, but the basic elements of the system of administration of biomass digester and gas storage tanks and waste resulting digestate. Biogas sector in Poland is still not very large, but rapidly growing.

Keywords: biogas plant, biomass, biogas, renewable energy, waste, anaerobic digestion

I. Introduction

Currently, there more and more emphasis is placed on the use of energy from renewable sources. This is in line with EU regulations and national policies in the field of environmental protection. Along with economic development in Poland consumes more and more energy, mostly derived from the combustion of fossil fuels (coal and lignite), which destroys the environment. Coal reserves are running out, so in order to ensure national energy security, it is necessary to increase the share of renewable energy in total energy production in Poland. One way of obtaining renewable energy is the production of biogas that can be used as a source of electricity, heat, as well as motor fuel.

II. Biogas plant - definition, types

The biogas plant is a installation, used for the production of biogas - "fuel gas produced from biomass and / or the biodegradable fraction of waste, that can be purified to natural gas quality, to be used as biofuel or wood gas" [1]. The biogas enters mainly methane and carbon dioxide. The larger the share of methane, the more calories biogas [2]. The biogas plant biogas production takes place in a targeted manner.

The biogas can be produced from different types of organic materials . These include [3]:

- food waste , including alcohol (remains of vegetables, fruits , fats and cheeses, waste brewer) ;
- precipitation of crop production (the production of cereal hay , feed) ;
- slaughterhouse waste ,which are not considered particularly dangerous (Category 2 - manure, tract content , products of animal origin containing residues of veterinary drugs , animals killed as a result of disease , and Category 3 - including animal parts unsuitable for human consumption , such as hooves, skin)[4] ;
- waste from animal production (dry droppings, manure) ;

- energy crops (specially grown corn, root crops , canola and alfalfa) .

Biogas power these materials are classified as agricultural biogas plants . Apart from them, the biogas can be formed at municipal landfills or wastewater treatment plants. They use the material available on the site - selected waste or sewage sludge .

Depending on the material used in biogas plants are used in different types of technology and equipment.

III. The principle of operation

Typically biogas plant consists of [5]:

- biomass feed system ;
- digester ;
- tank fermented substrate ;
- built gas tank .

The batch is introduced into the grinding and feeding of biomass , from which goes to the fermentation chamber hermetically sealed . The method of administration is dependent on the material properties . In the digester , in the absence of oxygen , with the participation of relevant bacterial fermentation processes occur . This is usually a container made of steel or reinforced concrete with a mixer which enables accurate distribution of supplemented feed , maintaining a constant temperature , acidity , and a steady release of methane. The released gas is discharged into the tank.

Mostly in biogas plants , there are also different types of plants to use biogas , converting it into electricity or heat in the combustion process . Most current devices of this type are cogeneration units or modules [6].

The biogas is used in many sanitary, security and control systems.

Simplified process for biogas generation is shown in figure1.

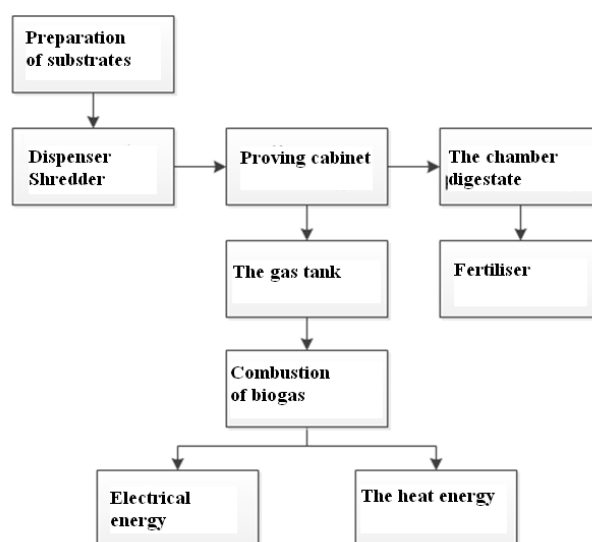


Fig. 1. Functional diagram of biogas plants

The quality of the biogas produced is dependent on the type of raw material batch mixing accuracy and the time and temperature of fermentation [7].

After the production of biogas waste is post-fermentation, which in some cases can be used as fertilizer. If the process uses such as feedstock plant, animal droppings or inedible animal products, it's necessary sanitary and chemical analysis of the waste may be sent for further agricultural use [8].

IV. Biogas plants in Poland

The Polish biomass power lies great potential, as evidenced by the Renewable Energy Research Institute [9].

In developed in 2010 by the Council of Ministers of the "National Action Plan for renewable energy " one of the goals is that by 2020 every Polish community was an average of one biogas plant [10].

In Poland there are 31 biogas plants , managed by 24 operators . The largest of these is the company Poldanor , which includes 8 installations [11].

Since early 2013 , we established two new agricultural biogas plants (in Koczergi and Kostkowicach) [12] , and their number will continue to increase . Currently, the largest on-going investment in the construction of bio-energy plants in Inowrocław Szarleju whose power will be 3.2 MW. 70 % of investments are funds received under Measure 9.4 of the Operational Programme Infrastructure and Environment [13].

The National Fund for Environmental Protection and Water Management awarded substantial funding to invest in this area. Will be supported 14 projects , which are the result of agricultural biogas plants with a total capacity of 15 MW [14].

As a feedstock for biogas plants can be successfully used as sludge from sewage treatment plants . In Poland there are over 4 000 treatment , but only 75 are equipped with systems capable of producing and processing of biogas residues of these are treated as waste and to landfills [15].

Among the degassing installation in landfills is still a lot of it is designed to recover the resulting gas . In 2011, of 428 landfills with the installation of degassing until 276 operators discharged gas to the atmosphere , not rendering the use of it or in any process [16]. Only 91 systems are fully functional biogas plants [17]. Production of biogas from waste contributes to solve both the problem of shortage of energy from renewable sources , as well as an excessive amount of landfill waste that pose a threat to the environment.

As you can see , the production of biogas and its use for the production of electricity, heat and fuels takes place in Poland is still too small . However, technological developments , the availability of raw materials , and to

support investment because of the high priority to contribute to the high rate of development of the sector.

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