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THE USE OF BIOGAS PLANTS IN AGRICULTURE OF BELARUS

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Summary. The article deals with biogas plants, their advantages and disadvantages. The closed technology of biogas production is described. Examples of biogas plants used in Belarus are given.

Key words: biogas, a biogas plant, agriculture, energy, alternative energy, processing.

Formulation of the problem. Nowadays, the question of alternative and renewable energy is increasingly being raised, and more and more countries are using and developing it, to one degree or another. Such energy is an important part of the energy capacity of each country. Unlike the Russian

Federation, the Republic of Belarus does not have such large energy resources, so the country is looking for alternative sources of energy. One of the special types of alternative energy generation is the production and utilization of biogas for the generation of electricity and heat.

Basic research materials. A biogas plant is a plant designed to ferment organic substances and convert them into biogas. Biogas is a mixture of gases formed during the decomposition of organic matter in the absence of oxygen (anaerobically), consisting mainly of methane and carbon dioxide.

Biogas production is an excellent solution to the problem of processing biological waste from livestock farms and obtaining additional profit by farming enterprises. As a result of such a recycling, it becomes possible to solve environmental problems associated with the concentration of large amounts of liquid and solid manure, rotting products of plant raw materials and household waste [1].

The composition of biogas includes methane CH_4 – 40-70%; carbon dioxide CO_2 – 30-60%; other gases – 1-5%; hydrogen H_2 – 0-1%; hydrogen sulfide – H_2S – 0-3%.

The closed technology of biogas production includes the following cycles:

1. Collection and preparation of biomass. All large fragments entering the installation are crushed, if the humidity level is below normal, the substance is diluted with pure non-chlorinated water.

2. Loading the product into the bioreactor and its maintenance. The fully prepared filtered substrate is heated to the desired temperature and loaded into a bioreactor. It should be mixed regularly (1-3 times a day) to avoid stratification of the mass. After the appearance of positive pressure, gas enters the gas tank.

3. Waste disposal. The dense waste that has settled to the bottom is an excellent fertilizer. If added to the soil, it improves its structure and quality. The liquid layer formed on the top of the solid substance also serves as a natural fertilizer to accelerate plant growth.

4. Gas purification. Biogas purification technology consists of several stages that affect the removal of specific substances. Water is removed from the product by condensation, and carbon dioxide and hydrogen sulfide are removed using high-pressure sorbents. The cleaning procedure is carried out on industrial equipment using accurate temperature and pressure indicators, which is impossible at home.

5. Generation of thermal and electrical energy. The thermal and electrical energy received at the output can be used for the needs of the enterprise [2].

With the help of a biogas plant, it is possible to process such raw materials as animal manure and bird droppings; vegetable waste; substandard grain and vegetable harvest; grain bard; meat and fish farming

waste; beet pulp; waste from beer and milk factories; household organic waste; residues from rapeseed production; organic garbage.

The biogas plant can operate in several modes:

- generating only electricity;
- generating only heat;
- generation of electricity and heat. [3]

All these modes are used in agriculture depending on the needs of the farm or agricultural production.

The installation of a biogas plant using practically any type of organic fuel may be one way of solving the problem of poor energy supply to agricultural enterprises due to their remoteness and lack of energy. Moreover, advantages of biogas plants include:

1. Rational disposal of organic waste. Thanks to the installation, it is possible to put into action what otherwise would have remained just garbage polluting the environment.

2. The inexhaustibility of raw materials. Natural gas and coal will run out sooner or later, but those who have their own farm, the necessary waste will appear constantly.

3. A small amount of carbon dioxide. It is released into the atmosphere when using biogas, but carbon dioxide cannot negatively affect the environmental situation.

4. Uninterrupted and efficient operation of biogas plants. Unlike solar collectors or wind turbines, biogas production does not depend on external conditions in any way.

5. Risk reduction through the use of multiple installations. Large bioreactors are always a big threat, but it can be eliminated if you make a system of several fermentors;

6. Obtaining high-quality fertilizer.

Still, biogas plants have some disadvantages such as increased danger of equipment; energy consumption required for processing raw materials; insignificant biogas output due to the small volume of home systems.

There are already several pilot projects for biogas complexes in Belarus. For example, in 2018, the Rudakovo biogas complex with a capacity of 2.5 MW was put into operation. The complex uses animal husbandry waste as raw materials and produces biogas to ensure the operation of its own boiler house.

A project for the construction of the Batchi biogas complex in the Vitebsk region is also being implemented. The complex will use agricultural waste and produce up to 5.1 MW of electricity and 4.8 MW of thermal energy.

In addition, programs to support the development of the biogas industry are being developed and implemented in Belarus. For example, there is a state program “Energy saving and energy efficiency improvement for 2021-2025”, which provides for the development of biogas energy and encourages investors to create new projects in this area.

Thus, Belarus strives for the development of the biogas industry and the use of renewable energy sources to improve the environmental situation and increase the energy independence of the country.

Conclusion. Based on the above described in the article, the following conclusions can be drawn:

1. Biogas plants, as well as other types of alternative energy, have been developing rapidly in recent years all over the world.

2. Thanks to biogas plants, agricultural enterprises and farms can supply themselves with energy, although not completely, but have a reserve that can supply not only themselves, but also transmit energy to the grid.

3. Waste-free production, as well as the maintenance of the first principles in the form of one person contributes to their use not only in agriculture, but also in the processing of organic waste, which helps to reduce the littering of cities.

4. Biogas plants are more relevant than ever for our country.

Additionally, we would like to emphasize that a biogas plant has a numerous advantages, but at the same time it has disadvantages. That's why the main thing when building a biogas plant is to know all the advantages and use them to their advantage, as well as to try to avoid negative sides of this type of energy supply, having understood and analyzed them in advance.

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