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ЖИНАҒЫ*

***СБОРНИК МАТЕРИАЛОВ
ІХ МЕЖДУНАРОДНОЙ НАУЧНО – ПРАКТИЧЕСКОЙ
КОНФЕРЕНЦИИ: «АКТУАЛЬНЫЕ ПРОБЛЕМЫ ТРАНСПОРТА И
ЭНЕРГЕТИКИ: ПУТИ ИХ ИННОВАЦИОННОГО РЕШЕНИЯ»***

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В сборник включены материалы IX Международной научно – практической конференции на тему: «Актуальные проблемы транспорта и энергетики: пути их инновационного решения», проходившей в г. Нур-Султан 19 марта 2021 года.

Тематика статей и докладов участников конференции посвящена актуальным вопросам организации перевозок, движения и эксплуатации транспорта, стандартизации, метрологии и сертификации, транспорту, транспортной техники и технологии, теплоэнергетики и электроэнергетики.

Материалы конференции дают отражение научной деятельности ведущих ученых дальнего, ближнего зарубежья, Республики Казахстан и могут быть полезными для докторантов, магистрантов и студентов.

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OVERVIEW OF THE POSSIBILITIES OF BIOMASS AGRICULTURAL PRODUCTION OF BIOGAS IN KAZAKHSTAN

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Adequate management of biomass waste generated in agriculture and the food industry can reduce their negative impact on the environment. An alternative use of agricultural waste is the production of biogas. Biomass feedstocks intended as a substrate for agricultural biogas plants may include energy crops, biotopes, animal and plant products, and organic waste from food production. This study examines the potential of individual biomass waste in the agri-food industry in terms of use for the production of biogas in agriculture in Kazakhstan.

Input data for agricultural biogas plants may be based on local waste and related products that require appropriate disposal or storage conditions, and may be burdensome for the environment. Given the projected potential of biomass, the assumptions that determine the extent of agricultural biogas use, and the undeniable advantages of biogas production, in agriculture, biogas plants should be considered as a promising sector for sustainable electricity and heat production in Kazakhstan, especially in rural areas.

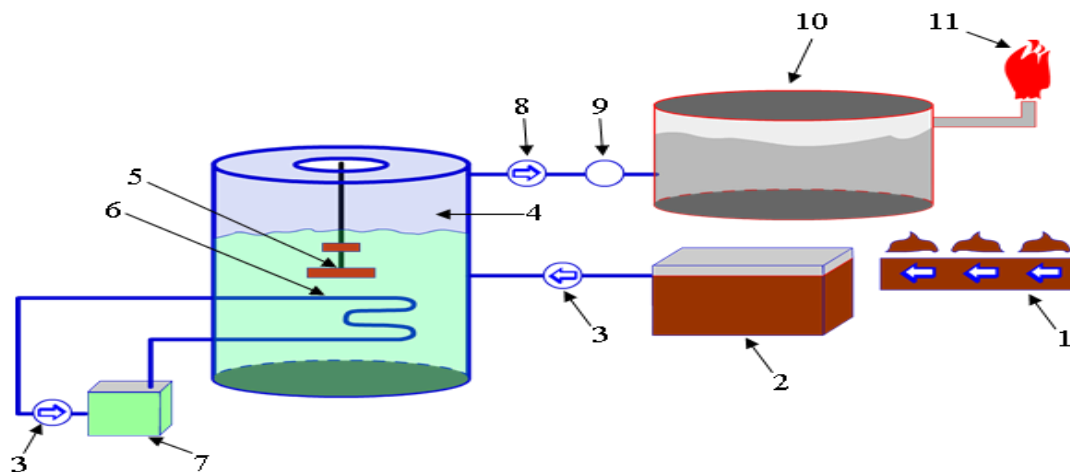
A permanent source of biomass for energy production in Kazakhstan is the movement of livestock products. The annual output of livestock and poultry waste by dry weight is \$ 22.1 million tons, or \$ 8.6 billion. M³ of gas (cattle - 13 million. Tons, sheep-6.2 million tons, horses - 1 million. Plant residues-17.7 million tons (wheat-12 million tons, barley-6 million tons, or 8.9 billion m³), which is 14-15 million tons for conventional fuel or 12.4 million. Despite the decline in the number of livestock and poultry, the processing of collected animal waste is promising [1]. Due to their processing, biogas can be obtained up to 2 million tons per year. Processing of this gas in electric gas generators will allow to receive annually up to 35 billion kWh (if necessary for agriculture, half of the total energy consumption) and 44 million Gigacalories of thermal energy at the same time. In addition, if biogas is used for electricity production, its cost price is indicated only 0.025-0.075 dollars per kWh, and electricity from traditional sources–0.1-0.15 dollars per kWh.

The use of biogas is very important today, as the reserves of natural gas, oil and coal are not unlimited. Thanks to the construction and organization of biogas plants, it is possible to obtain not only environmentally friendly fuel, but also organic waste, which can serve as a positive result in the future. In some types of production, this is the optimal solution, which has a significant impact on savings and allows you to reduce the cost of production, increase the efficiency of biogas plants [2, 3].

As a result, the company is able to achieve some energy independence.

In addition to these biological gas production plants, it is also possible to install complex cogeneration equipment that converts gas into energy, ensuring its production.

The biogas plant produces biogas and biofertilizers from biological waste from agriculture and the food industry by oxygen-free fermentation. Biogas is a product of the vital activity of useful methane-forming bacteria. Microorganisms in anoxic conditions (anaerobic) are metabolized by carbon from organic substrates. This process must occur after a food chain called fermentation. [4].



1-organic residue; 2 – organic residual receiver; 3-pump; 4-bioreactor; 5-mixer; 6-heater; 7-boiler; 8-filter; 9-compressor; 10-gas tank; 11-gas.

Figure 1 - General scheme of the method of obtaining energy by biomass

Diagram of the biogas installation. The basis of a biogas plant is a bioreactor or bunker. There is a fermentation process in which the resulting gas accumulates. In addition, there is a loading and unloading hopper, the extracted gas is discharged through it, inserted into the upper part of the pipeline. A gas treatment system is provided-its cleaning and increasing the pressure in the gas pipeline to the working one.

For mesophilic and thermophilic modes, a bioreactor heating system is required to reach the required modes. For this purpose, gas boilers that run on extracted fuel are usually used. From it, the pipeline system goes to the bioreactor. Usually these are polymer pipes, as they tolerate walking well in an aggressive environment. Again, a biogas plant needs a system for mixing the substance.

During fermentation, a hard crust forms on the top, heavy particles fall down. To maintain a homogeneous state of the processed mass, mixers are necessary, which can be mechanical or even manual. It can be a timer or a manual start. It all depends on how the biogas installation is performed. The automated system has a large number of passageways during installation, but requires minimal attention during operation.

The analysis of the agriculture of Kazakhstan, its structure, branches and characteristics, as well as the calculation of the potential for the production of biofuels from agricultural waste showed that the highest value are: Kostanay, Akmola, North Kazakhstan, Pavlodar, East Kazakhstan, Almaty and South Kazakhstan regions. The average potential are Karaganda, West Kazakhstan, Zhambyl, Aktobe. The rest of the industries are low-potential and not promising in this respect [5].

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