

Project name: IRN AP13068541 "Development of an experimental energy complex based on a modernized boiler plant using biofuels"

Relevance: This project is aimed at developing an experimental energy complex that will produce thermal energy from biomass or animal husbandry waste, consisting of a biofuel production site, a plant for the synthesis of biogas - gaseous fuel from animal products, a thermal generator - a hot water boiler for generating thermal energy up to 0.43 MW. At the same time, it is planned to create an installation - a new type of boiler running on biogas and allowing waste to be processed efficiently.

Objective: The aim of the project is to develop an experimental energy complex for the production of thermal energy from biomass or animal waste, consisting of a biofuel production site, a biogas synthesis plant, a thermal generator - a new type of hot water boiler for generating thermal energy, running on biogas and allowing efficient waste processing.

Expected and achieved results:

- Design documents of the new installation will be developed taking into account the shortcomings of similar models.

- The design documentation of a new biogas boiler with a thermal capacity of 0.43 MW with an automatic burner will be developed on the basis of existing studies, as well as taking into account the shortcomings of analogues.

- New parts of the animal products processing plant will be manufactured on the basis of design documentation.

- An installation with auxiliary tanks and an experimental 0.43 MW hot water boiler will be assembled.

- A block-modular installation will be manufactured to accommodate a prototype with tanks for biogas and a hot water boiler with an automated burner.

- A complex for processing animal products and biogas production will be launched, followed by disposal in a boiler to generate thermal energy.

- Indicator of results: scientific and technical report, patent and information search report, design documentation for the development of the installation, design documentation for the development of a new boiler, patent application for an invention, 1 article in the publication recommended by the Committee for Control in the Field of Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan, 2 articles in the rating publication, included in the Scopus or Web of Science database with a percentile of at least 35.

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List of publications and patents published within the framework of this project:

In 2022, based on the results of research, 4 scientific articles were published in a domestic journal and materials of prestigious international conferences:

1. G.U.Tursunbayeva, B.T.Bakhtiar, M.S.Korobkov, A.K.Mergalimova "THE current state of the problem of biogas production" Bulletin of KazATK, 121(2), 478-485. DOI: <https://doi.org/10.52167/1609-1817-2022-121-2-478-485> .

2. G.U.Tursunbayeva, B.T.Bakhtiar, Baizhan G.A., A.K.Mergalimova "BIOGAS production from animal husbandry biomass" KazATK Bulletin, 122(3), 171-181. DOI: <https://doi.org/10.52167/1609-1817-2022-122-3-171-181> .

3. G.U.Tursunbayeva, B.T.Bakhtiar, G.K. Balbayev "Construction of a simulation computer model of a wind power plant in the environment" Bulletin of KazATK, 122(3), 171-181. DOI: <https://doi.org/10.52167/1609-1817-2022-122-3-246-254> .

4. B.K.Aliyarov, G.K. Balbayev, B.T.Bakhtiyar, M.B. Beisenbayev "Development of hybrid public transport A way to reduce carbon pollution of the city's atmosphere" Bulletin of KazATK, 122(3), 171-181. DOI: <https://doi.org/10.52167/1609-1817-2022-122-3-246-254> .

5. Bakhtiyar B., Mergalimova A., Korobkov M., Tursunbayeva G., Zhumaliyeva A. "Development of an experimental energy complex based on an upgraded boiler plant using biofuels" 2022 International Conference on Communications, Information, Electronic and Energy Systems, 2022, Veliko Tarnovo, Bulgaria. <http://ciees.eu/index.php> (Accepted for publication)

Information for potential users:

The design documentation of a new biogas boiler with a thermal capacity of 0.43 MW with an automatic burner will be developed on the basis of existing studies, as well as taking into account the shortcomings of analogues.