Journal of Modern Technology & Engineering
Vol.3, No.2, 2018, pp.179-183

ON AN APPLICATION OF SMALL COGENERATED BIOGAS DEVICES IN THE FARMS

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Abstract. Thermal energy, electric energy or high quality fertilizer can be produced using IT and automation equipments, cogenerator and small biogas device (the last two are aimed to use renewable energy sources), and the wastes generated by applying them in agriculture. At the same time the use of produced energy in feed production is also very possible. In the work an idea of the scheme is proposed for production a biogas and its use in the small farms with application of the modern IT.

Keywords: *renewable energy, biogas device, quality fertilizer, feed production, a cogeneration device.*

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Received: *07 May 2018;* ***Accepted:*** *28 June 2018;* ***Published:*** *02 August 2018*

1. Introduction

Firstly, the participants who will take part in this process are determined then they begin to prepare the installations for feed production. After these steps, additional goods and materials are listed and their precise prices are determined while the equipment brands are identified. The most essential equipments for proceeding this process are the parts of biogas devices which includes in goods and materials; cogenerator device, auxiliary device for feed production, automation installations which are controllers, sensors, pressure and temperature regulators. In separated place the installation of biogas devices are accomplished, following that cable lines are placed and are connected with the feed production equipment. The auto-control of production process is considered to be done with the aid of IT equipments. We can get electric and thermal energy by getting the gas from biogas device and giving it back to cogenerator. The obtained energy is used in feed production device. The main purpose here is related to the appliance of small cogenerated biogas devices to farms using renewable energy sources. In most of well-developed countries of the world the use of renewable energy sources which are pure and alternative from ecological side as well, is getting more and more popularity day-by-day.

Some countries have begun to take serious steps in this matter by considering the damage which is derived from mostly the use of traditional energy sources and the danger that comes gradually because they will run out of someday soon.

2. Solving the problem

The hydrocarbon reserves of the world, which are the traditional source of energy used by the countries for many years, are gradually exhausting. According to experts'

estimates, these resources can be sufficient at best up to 80-100 years. At the same time, the fast development of technology, the consumption of fuel types which can create thermal effect result in contamination of environment. Taking into account the depletion of oil and gas resources, as well as the preservation of the ecological balance, the necessity to use alternative and renewable energy sources in the world arise faster.

Favorable geographical location and climatic conditions make it possible to use environmentally sound alternative and renewable energy sources in Azerbaijan like in developed countries of the world. Recycling of waste from waste is part of renewable energy. Energy consumption from livestock is lower than the cost of other types of renewable energy (i.e. solar and wind) and is cheaper to get. Also, getting energy in this way will promote the beneficial use of waste. And helps to protect the environment and stimulates the production of quality fibers for agriculture. There are more favorable conditions in rural areas to expand this method.

Additionally, the further advantage is that there will not be any need to transport the obtained energy to the long distances. Furthermore, it contains educational feature in itself

The introduction of new technologies into agriculture in larger scale, the promotion and stimulation of innovations will be an example for other farmers. Here are a few goals considered:

- The first one is that by using the manure in this way both energy and valuable fertilizers can be produced in sufficient amount.
- The second is to prevent any type of increase in the price of agricultural products if an increase in the price of energy occurs. Here cogeneration installation will provide both itself and social buildings with energy.
- The third goal is to use directly the energy produced in the production of feed in agriculture.
- The fourth objective is to reduce the impacts of waste on the environment;
- The fifth purpose is the application of the technological process which here is a cogeneration type that produces both electricity and heat energy, in small power generation equipments, for the first time.

When the process is carried on heat and electricity and fertilizer will be generated from agricultural waste and we will gain experience. The project will be submitted to the relevant authorities as well as to large farms for large-scale implementation. Given the scale of further development of the project, it is possible to say in advance that it will be used in broader context. In the project the implementation of ICT equipment and service of this system is also intended. In the future it is planned to introduce ICT equipments in small farms of neighboring countries (Central Asian countries, Iran, Turkey, Georgia and Arab countries) and to complete the presented system implementing the project will save energy and increase agricultural production and will contribute to the food security policy implemented by our state. It will stimulate the energy production sectors, the implementation of innovative technologies in agriculture in our country. There will be an increment in the amount of job opportunities and it will boost the quality of life of employee in agriculture.

In our country manure produced in farms is used as a low-quality fertilizer. This causes the formation of wild weeds in planting areas. In our proposed project, the energy will be derived from manure and high quality fertilizers will be obtained for the farm. Here, production of both electricity and heat energy will also be possible. The energy generated will be consumed on feed production in agriculture. In addition, all

production and processing processes will be automated. Transmission of energy generated will not be a problem. The energy produced at the farm will be spent on the needs of the farm and will lower the costs of forage products on agriculture. Manure will be reused as quality fertilizer. The production process of energy and agricultural products will be waste-free and automatic. Schematically, the technological process will be in this form (Fig. 1). Heat and electricity will be generated from waste (mainly from manure), energy obtained will be used for the energy supply of the buildings and for the production of feed in the farm. The entire process will be managed by coordinating ICT and automation equipment together. As noted above, waste-free closed agricultural products and energy production will be organized. After the application of the prepared biogas plant, samples will be taken and applied in other farms. There will be no loss of energy due to transmission and it will be used directly for feed production.

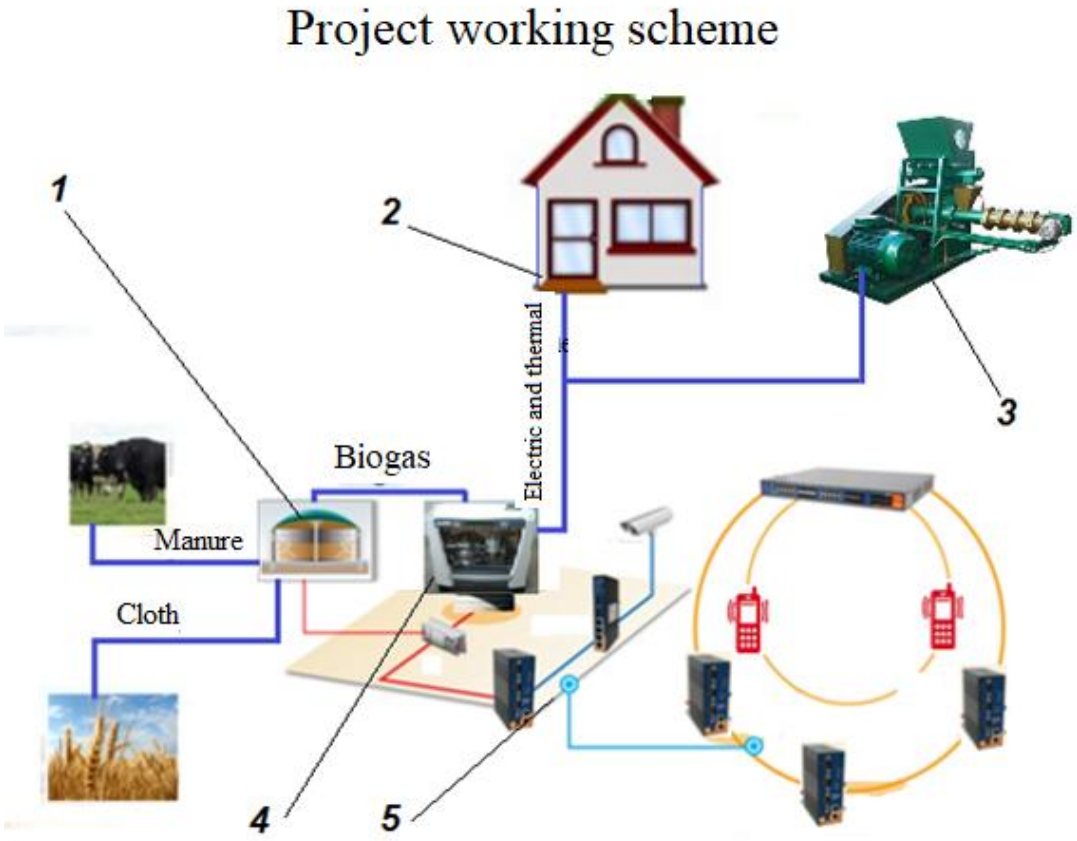

Figure1. Technological scheme: 1- biogas installation, 2-building, 3- fodder production unit, 4 - cogenerator, 5 - management system.

The application of modern technology and ICT in production sector will be expanded. The project will use modern controllers, sensors, pressure and temperature regulators, other high quality ICT facilities, perfect biogas plants (based on German practice) and cogenerators. Despite the implementation of similar projects, the proposed project has many advantages over the project that have been carried out in past: here, some of them have been mentioned: the cogeneration equipment will be utilized for the first time in the small biogas plant, high-quality manure fertilizer will be produced,

automation will be introduced to the fodder production, modern ICT and automatics will be applied. The equipment persuaded in the project should meet specific requirements. Controllers, sensors, pressure and temperature regulators, other ICT facilities, biogas installations, equipment for feed production facility must comply with relevant standards, meet operational requirements. By the aid of controllers and sensors synchronous operation of biogas plant, cogeneration equipment and feed production facility will be ensured. The project will use small biogas plant and cogeneration unit, ICT equipment, feed production facility, automation equipment. The energy generated (3-8kW) will be directly spent on feed production as well. Energy production will cut the costs of feed in agriculture and will have a positive impact on the environment. Because the project is related to energy and feed production, the risk level will be very low. Nevertheless, the insurance activities will be strictly carried out to deal with the issues that may arise. One of the other risks might be the decrement in energy prices, which is very unlikely. Additionally, the acquisition and delivery of the necessary equipment for the project can be a problem. Sufficient experience of team members in obtaining such equipment eliminates this risk. Experts selected to cope with the implementation of the project have been identified by considering their knowledge and skills, the scale and quality of work that they have done before. Extra personnel are envisaged. The work done at the end of each stage of the event will be discussed with the participants once again, deficiencies will be detected and some actions will be taken in order to have further improvements.

3. Conclusion

The project will begin to generate revenue shortly after the start. Most of the energy gained will be consumed on the farm and will be used in feed production. The main target will be to expand the project.

Thus, by consuming the manure in this manner both the production of high quality fertilizers, the production of fodder in agriculture and the reduction of the cost of these products will be carried out, energy will be provided by the cogeneration plant and social facilities, the environmental damage will be reduced, the use of new technologies in all the production and processing processes in the field of ICT will be made. For the first time a waste-free closed technological process will be created in small power generation equipment in cogeneration type (which means both heat and electric energy production). The use of labor of young people is a positive feature of the project.

It is also planned to cover the project regularly in the media, including on the internet and negotiate with relevant agencies for application in other areas.

Acknowledgement. This work was supported by the Azerbaijan University Grant project “Green energy for the healthy world”.

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