

## Chapter 8

# Obtaining and Using Biogas in Agricultural Production

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### ABSTRACT

*In recent years, an increased interest has been shown in fuels derived from renewable energy resources of animal and vegetable origin, raw materials of which are practically unlimited. The use of biofuels makes it possible not only to replace petroleum motor fuels with alternative ones, but also to improve exhaust gas toxicity indicators (as a rule, there is a marked decrease in emissions of toxic exhaust gas components). This work is devoted to the study of the possibilities of solving these problems in order to adapt diesel to biogas, a theoretical study of ways to create an experimental model of a power plant for generating electricity from biogas, a theoretical study on the processes occurring in the main components of the plant being developed and the creation of this plant.*

## INTRODUCTION

Energy supply of agricultural production underlies the production culture, living standard in the countryside, productivity and efficiency of performed work. Solid fuel, gas and liquid fuel remain among the main energy carriers despite the active introduction of electric power engineering into rural life. Proportion of these fuels is more than 80% in the industry, and the approximate ratio between them is 3:3:2, respectively.

Biological factors of production play a key role in the rural energy sector. And they form a unique agro-energy system together with man-made means and objects of labor. This system is not only consuming and transforming energy resources, but also producing energy. Increasing the proportion of energy supply from bio-resources remains an important task, especially for agricultural production from waste. Recently, many scientists have been paying a lot of attention to this issue, which is described in detail in the book edited by Dahlquist (2013).

Resource conservation is a set of measures to find reserves on the basis of reducing waste and losses. It is a waste-free use of resources, the maximum elimination of all types of losses, maybe the fuller involvement of secondary material and energy resources into economic circulation.

The functioning feature of the agricultural industry is that biological objects (soil, plants, and animals) act as objects of energy technologies. This affects the characteristics of energy consumption and distribution, as well as possible energy sources. The energy intensity of the products produced is a factor in its competitiveness. The increase in agricultural products by 1% entails an increase in consumption of energy recourses by 2-3%.

The use of alternative fuels is necessary to reduce dependence on expensive energy resources and eliminate the instability of their supply (especially electricity). Biogas is obtained from crop and live-stock waste, which is used for heating and hot water production, as well as power generation. The work of Weiland (2010) is devoted to this question.

In recent years, an increased interest has been shown in fuels derived from renewable energy resources of animal and vegetable origin, the raw materials of which are practically unlimited. The use of biofuels makes it possible not only to replace petroleum motor fuels with alternative ones, but also to improve exhaust gas toxicity indicators (as a rule, there is a marked decrease in emissions of toxic exhaust gas components). First of all, this refers to the exhaust opacity and emissions of other products of fuel incomplete combustion, which are reduced by 1.5...2 times when using biofuels.

At the same time, biofuels have physicochemical properties that differ from traditional petroleum diesel fuels. Therefore, when transferring engines that were originally adapted to work on diesel fuel to biofuels, a number of problems arise associated with the organization of work processes, primarily the processes of fuel feeding, mixture formation and combustion. This is much more relevant to gaseous fuels (in particular, to biogas), since these fuels are in a different state of aggregation compared to diesel fuel.

This work is devoted to the study of the possibilities of solving these problems in order to adapt diesel to biogas, a theoretical study of ways to create an experimental model of a power plant for generating electricity from biogas, a theoretical study on the processes occurring in the main components of the plant being developed and the creation of this plant.

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