METODE FOR STIMULATION OF BIOGAS PLANTS REALIZATION

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Abstract

Agriculture is a young member of the energy and waste management sector, but under the conditions of investment and energy politics of EU, biogas plants must be one of the partial solutions. Despite the high potential in terms of biogas production from agricultural sources, Romania has among the lowest biogas production in Europe. Although currently there are several biogas plants (not in agricultural sector) totaling an installed capacity of only 4 MW, and producing in 2010 only 19 GWh electric power, the target for 2020 in Romania is 195 MW installed power, with an output of 950 GWh electric power. The main cause of the actual situation is the lack of economic incentives similar to those offered by countries as Germany.

Key words: sustainable agriculture, agricultural wastes, biogas production, anaerobic digestion

INTRODUCTION

Biogas sector is strongly connected with agriculture and residues from agrifood sector, as virtually any organic substrate can be anaerobic fermented and converted from pollutant to fertilizer and production of biogas reach in methane.

Contrary to the fact that Romania has quite ideal conditions to develop biogas from waste to an important pillar of the Romanian energy supply, only an almost unnoticeable part of the existing potential has been exploited yet. This is due to several types of bottlenecks such as lack of information and expert engineers (know-how).

The objective of this project is to reduce bottlenecks listed, through designing a biogas plants that can be moved to various farms, livestock and food companies to test in real operating conditions by students, teachers and experts in those businesses

MATERIAL AND METHOD

Given the main objective of the project, which is the mobility, we decided that the whole biogas plant including the electric generator and auxiliary installations are mounted inside a large container that can be transported by a truck or rail. The type of container chosen is eurocontainer 45" with external length of 13.716 m, width 2.438 m, height of 2.896 m, tare

5050 kg and maximum weight 32500 kg.

I chose a Plug-Flow type digester which will work in thermophil regime to process most types of waste and manure, to generate the maximum possible amount of biogas. Interior volume of the digester will be 24 m^3.

At the same container there are installed the cogeneration system for electricity and thermal heat equipped with dual fuel engine (diesel and biogas), measurement and automation system, the boiler for additional heating, pumps for input and exhaust, water separation system.

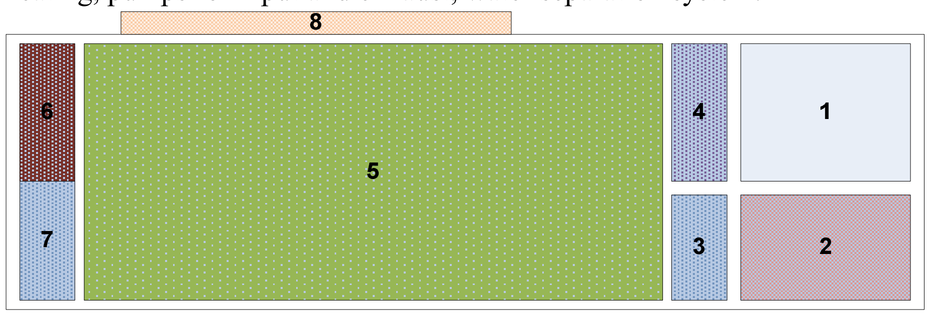

Fig. 1. Layout diagram of main components of the biogas plant
1 – CHP unit, 2 – measurement and automation system, 3 – boiler for water heating, 4 – chopper pump, 5 – digester, 6 – water separation system, 7 – exhaust pump, 8 – gas holder tank.

A PC equipped with extension cards forms the heart of the control and data acquisition system. Temperatures are measured at 8 positions in each digester and directly used for controlling the supply of process heat. The gas production is measured individually from each digester, and together with measuring the position of the gasholder, the actual consumption can be determined. The computer controls the agitators and valve actuators for the process heat supply. The system is prepared for automatic control of boilers, CHP´s, feeding of manure to the digesters and has several extension possibilities. The electric production from the CHP´s is measured as well.

The biogas plant is equipped with instruments for measuring simple indicators used for the daily operation and optimization of the biogas process. For measuring the amounts of solid and volatile matter in the manure and the organic wastes, a scale, a kiln, and a furnace are used. A pH-meter is used for measuring the pH value of the biogas process and the motor oil from the CHP´s. A gas sample pump is used for measuring the H_2S and methane contents of the biogas.

The waterborne heating system supplies the biogas process with heat from the boilers and CHP´s. For summer operation, excess heat can be ventilated to the free though the dump-load calorifiers which are an integrated part of the CHP´s.

The CHP unit with capacities of $15kW_{el}/24kW_{heat}$ is delivered with a complete control system including grid protection and grid connection.

The biogas installation is equipped with a chopping machine for pre-threading solid waste.

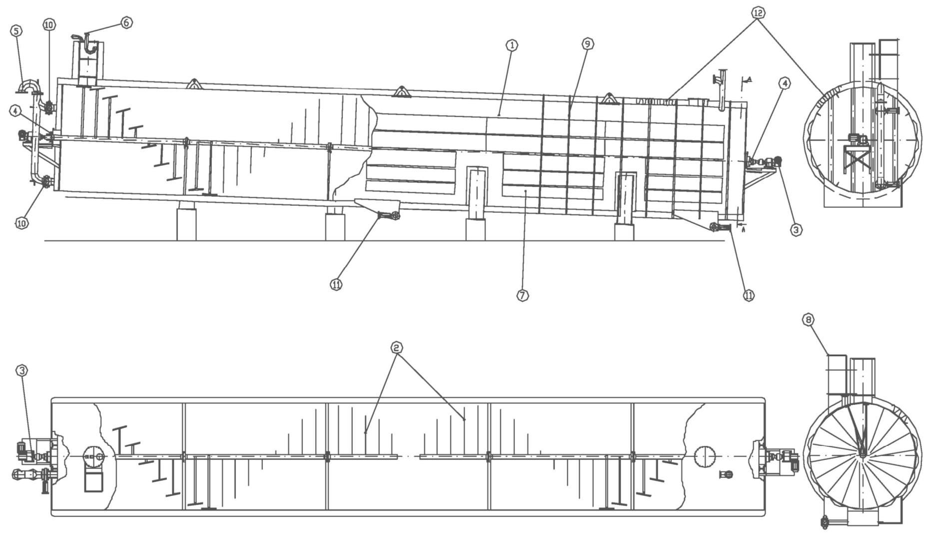

Fig. 2. The plug flow anaerobic digestor
1 - Tank, 2 - Agitator, 3 - Consol for agitator gear, 4 - Bearings and sealings, 5 - Manure outlet, 6 - Gas system (with siphon trap), 7 - Heat exchanger, 8 - Platform, 9 - Frame for insulation, 10 - Knife gate valve, 11 - Knife gate valve, 12 - Insulation material

RESULTS AND DISSCUSIONS

One of the highlights of the project is that at the installation of biogas system, the company must ensure only waste material supply and fermented material disposal site.

The CHP system is dual fuel type for be powered by diesel until the system will produce the amount of necessary gas for operation.

The biggest challenge is to optimize the process, so that the system is self-supporting and cost-effective to reach economically profitability.

Profitability is the main characteristic that can stimulate interest in this type of equipment

CONCLUSIONS

Practical realization of this project will stimulate the interest of all stakeholders, experts, teachers and students, on the economical and technical advantages of using renewable energies and in particular those based on biogas production. But without a review of relevant legislation, the progress of the biogas sector in Romania will be limited.

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