

3RD WORKSHOP ON APPLIED AND SUSTAINABLE ENGINEERING

03.06.2018 to 09.06.2018, Koszalin University of Technology, Poland

Methods of using chicken manure for energy production

Zdanowicz A., Faculty of Mechanical Engineering, Koszalin University of Technology, Poland

SUMMARY

The poster presents the possibilities of using chicken manure as an energy fuel. The aim of this study is to assess its potential in the field of energy production. The production of energy from chicken manure can be achieved by anaerobic digestion, direct combustion, and fluidized bed increments. Currently, most of these technologies are practiced on an experimental scale, only some of them on a commercial scale.

INTRODUCTION

The chicken manure is a mixture of manure and bedding material. The generation of energy from the co-production of the by-product of poultry production is considered one of the best alternatives to the problem of poultry waste management. Recent fluctuations in energy costs and increasing greenhouse gas emissions have made poultry manure a potential source of fuel, which may help in supporting conventional energy sources. Dung manure has good smoking properties due to its composition, making it a potentially great source of fuel.

Anaerobic digestion produces useful energy in the form of biogas (methane). Process includes three general steps;

1. Hydrolysis
2. Acetogenesis of the production of organic acids
3. Methanogenesis (biogas production) [3].

This technique is recommended for poultry manure because it would not require the addition of a significant amount of water to form a slurry. The produced biogas must be used immediately, as it can not be stored. In direct combustion, chicken manure is burned inside the boilers under excess air / oxygen. The hot exhaust gases generated in the process are used to generate steam. The steam turbine generators are used for production. The direct combustion technique is currently used to generate electricity in the USA. Another solution for using chicken manure as an energy carrier is created by the company [5].

Natural Energy concept of a production line consisting of a number of devices including :

Drying room - used to dry chicken manure to appropriate humidity

Pellet machine - there is a process of agglomeration of dry manure, which is then used to burn in the boiler room.

Boiler room - the obtained pellet goes to the boiler, and the obtained thermal energy is used for heating hen houses and utility rooms.

Heater - distribution of heat in poultry housing is done using a heater, which has an additional function of drying the house.

This contributes, inter alia, to optimize microclimatic conditions in poultry farming.

The Natural Energy production line is a house service system. The use of such systems will reduce: costs, level of emissions and greenhouse gases, the level of unpleasant odors. In addition, it will reduce the time needed to acquire the right temperature in the poultry houses, and most importantly, it will easily allow you to dispose of a by-product in the form of chicken manure [2].

The fluidized bed combustion process created by BHSL. A conventional diesel burner raises the temperature in the combustion chamber to a level that allows operation. Then the fertilizer is thrown into the sand bed and the combustion process begins. After the start-up, diesel is no longer needed - the plant is driven only with chicken manure mixed with bedding [4].

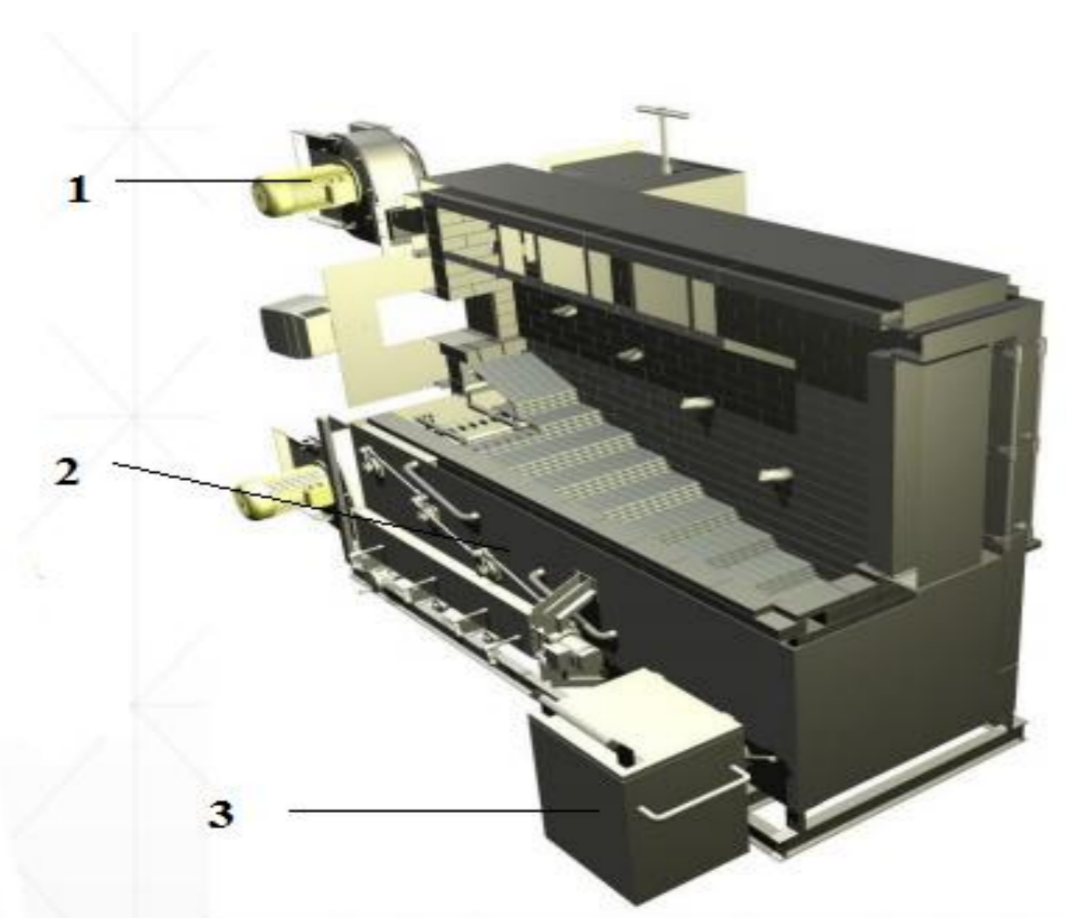


Fig. 1. Installation for burning chicken manure own fuel - a source of heat : 1 - combustion chamber, 2 - Container installation, 3 - Pre-evacuation system in the exchanger [3,4]

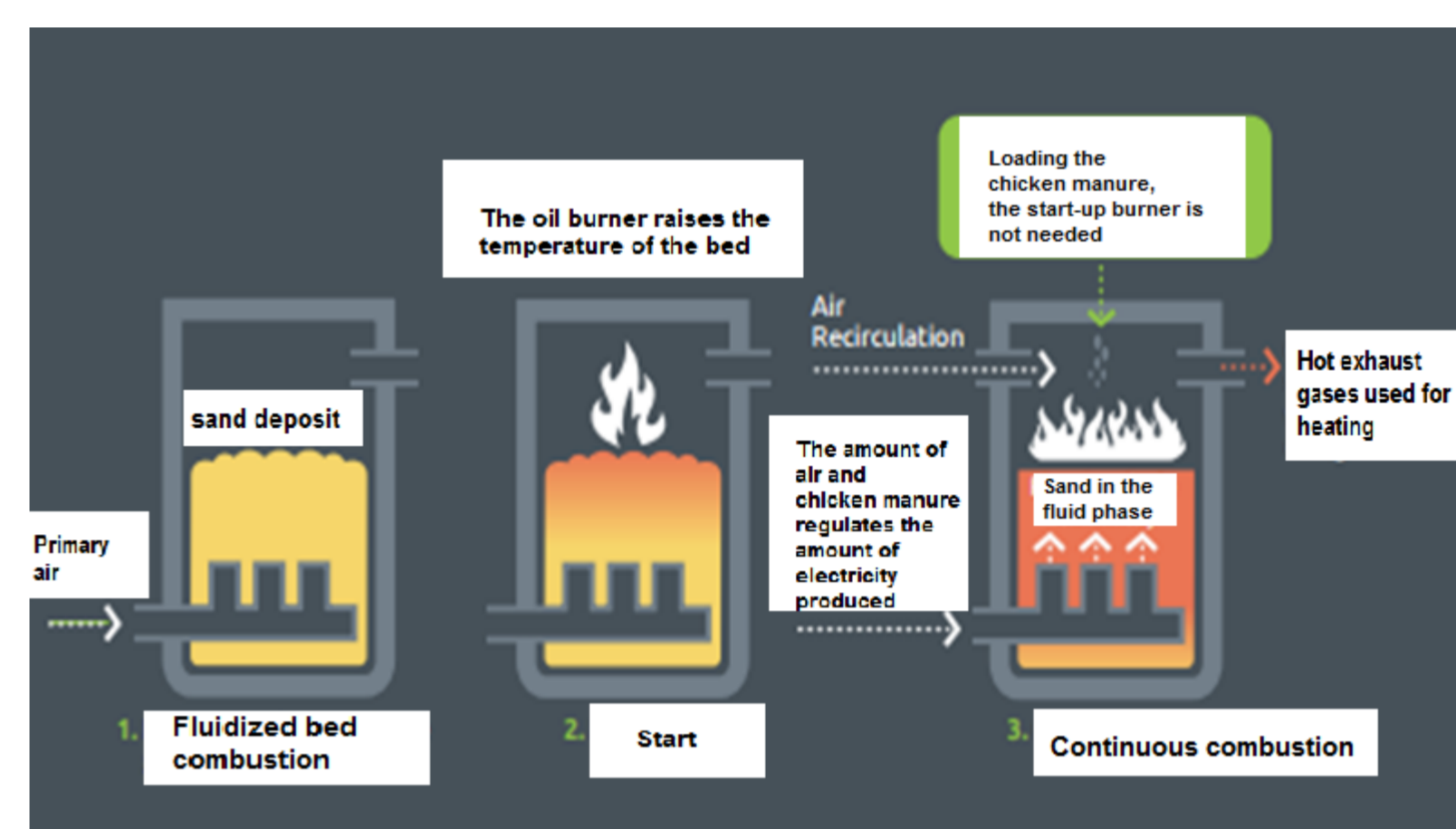


Fig. 2. The combustion line system of chicken manure on fluidized bed [1]

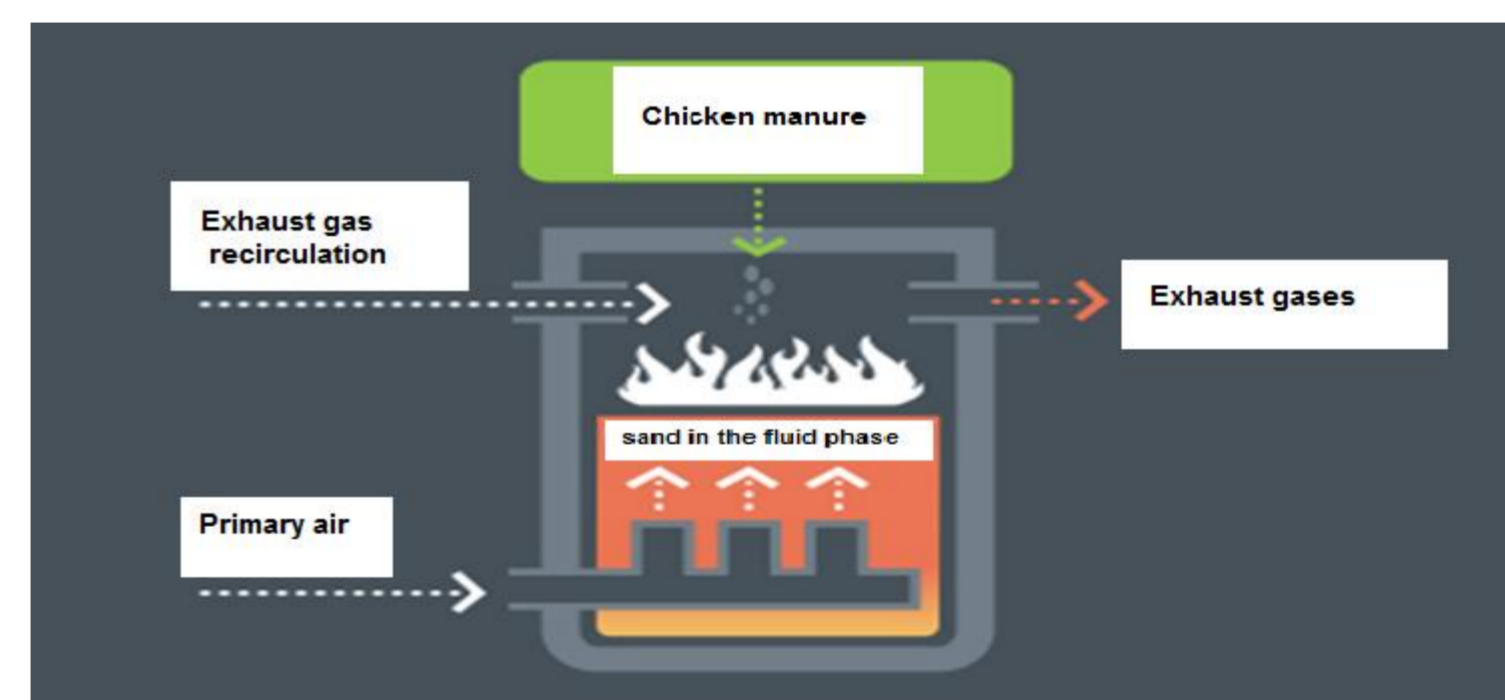


Fig. 3 Construction of a kiln for burning chicken manure [1]

CONCLUSION

Based on the analysis of the properties of available chicken manure, among others its calorific value and moisture content are developed installations corresponding to both the quality of the available biofuel. Benefits resulting from the use of chicken manure systems for energy production include, among others, the possibility of manure utilization, reduced heating costs and power supply to electricity. The issue of thermal management of wastewater, including chicken waste, is currently strongly promoted due to cost optimization. The ash generated in the combustion process is a valuable fertilizer, it offers, if necessary, the possibility of its management.

LITERATURE

1. https://www.bhsl.com/wp-content/uploads/2015/03/BHSL-How-it-works_Polish-Version.pdf
2. <http://www.natural-energy.pl/galeria/>
3. http://www.lfpdc.lsu.edu/publications/working_papers/wp88.pdf
4. https://www.imp.gda.pl/fileadmin/files/storage/konferencje/TER/referaty/3_dr_hab_inz_Dariusz_Kardas_-_IMP_PAN_-_Technologie_i_zasoby_energetyki_lokalnej_.pdf
5. <https://www.wattagnet.com/articles/25689-burning-poultry-litter-creates-clean-energy-for-producer>