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**Guide to Making Biogas from Livestock Manure using Digester made from Polyethylene Plastic (An Environmentally Friendly Technology)**

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Submitted: October 13, 2018 -Revised: November 11, 2018 -Accepted: December 1, 2018 -Published: December 31, 2018

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**ABSTRACT**

In rural areas, many farmers produce livestock waste, which can pollute the environment, both air, water and soil pollution. This pollution can be eliminated by being accommodated, which at the same time can be converted into environmentally friendly energy. In this case, offered an easy and inexpensive way to make biogas using polyethylene plastic as a digester. This system can be made easily by the people without using complicated technology. Rural communities in general use biogas as stove fuel for cooking.

**Keywords:** Livestock, Biogas, Digester, Polyethylene plastic

**INTRODUCTION**

In rural areas, people have long carried out energy conversion from kerosene to LPG (Liquid Petroleum Gas) and Blue gas to meet household energy needs. LPG needs from time to time continues to increase, so does the price. Therefore, a new breakthrough is needed in the use of alternative fuels, in this case, biogas is one of the alternative choices of future materials for people who live in rural areas. Therefore the community can be independent in providing energy for their household, by making biogas with livestock manure as raw material.<sup>(1)</sup>

In rural areas, many breeders produce sewage, which can pollute the environment, both air, water and soil pollution. This pollution can be eliminated by being accommodated, which at the same time can be converted into environmentally friendly energy.

Biogas is an alternative energy as a substitute for petroleum. It should be noted that the biogas contains CO<sub>2</sub><sup>(2),(3)</sup> with high levels that are not environmentally friendly, so it needs to be purified first, by separating CO<sub>2</sub> and CH<sub>4</sub> gas, for example using a nylon membrane.<sup>(3)</sup> Separation of the two gases it will produce purer biogas, which is at the same time more environmentally friendly. In addition, biogas can be obtained with higher quality methane, so the higher the quality of biogas produced.<sup>(3)</sup>

**THE USE OF POLYETHYLENE PLASTICS AS A DIGESTER IN THE BIOGAS MAKING SYSTEM**

In rural areas, biogas is generally made with raw materials for animal manure, especially cattle. In general, biogas production in livestock areas uses permanent digesters made of concrete or fiberglass. This permanent structure for people with lower middle income is more difficult to realize because it requires a relatively expensive manufacturing cost. In addition, it also requires knowledge and expertise about more complex construction systems. On the other hand, how to maintain this structure also requires special expertise. For people with low education, this condition becomes a particular obstacle in efforts to correct biogas as an alternative fuel.

Based on the above problems, the authors have innovated to design a biogas production system using a simpler and more practical digester. In this case, the basic material used is polyethylene plastic which is easily available at affordable prices by rural communities. In experiments that have been applied, it turns out that this plastic can be used as a digester that can last up to 2 years, with certain requirements, namely: 1) protected from direct sunlight, 2) protected from rain, 3) protected from disturbing living things, for example: animals, humans, and 4) other factors that can damage plastic.<sup>(1),(4),(5)</sup>

**PROCEDURES FOR MAKING BIOGAS USING POLYETHYLENE PLASTIC AS A DIGESTER**

Based on the results of studies on making biogas using polyethylene plastics, the characteristics of these plastics are explained as follows:

1. Plastic  
Plastic is one type of new material that has been widely developed and has been used since the 20th century. In the 1930s, the use of plastic was only a few hundred tons, in the 1990s its use had increased sharply to 150 million tons / year and in 2005 it had reached 220 million tons / year.<sup>(6)</sup>
2. Polyethylene.  
Polyethylene is one of the most widely used plastics, especially in industry. Plastic is easily formed, resistant to chemicals, clear and easily laminated. PE is also widely used as a medium for packing fresh fruits and vegetables, bread, frozen food products, textiles and so on.  
Details of the properties of PE include: 1) having a varied appearance, ranging from transparent to turbid, 2) easily formed, weak and easily stretched; 3) has a high tensile strength, without tearing, 4) resistant to chemicals, both acids, bases, alcohol and detergents, 5) waterproof and water vapor. By considering the properties of the PE, the PE is selected as a digester in an easy, inexpensive, safe and environmentally friendly biogas manufacturing system.<sup>(1),(4),(5)</sup>
3. Biogas reactor from polyethylene  
Digester is the main and vital part of the biogas manufacturing unit. Success The effectiveness (efficiency) and efficiency of the biogas manufacturing system is very dependent on: 1) the difficulty level of making the digester, 2) the affordability of costs for making the digester, 3) the difficulty level of operation and maintenance of the digester, 4) the continued use of the biogas reactor generator (digester).

Below (Figure 1) is a simple scheme that is easily applied about the design of biogas reactor plants from polyethylene (PE) plastic bags for household scale.

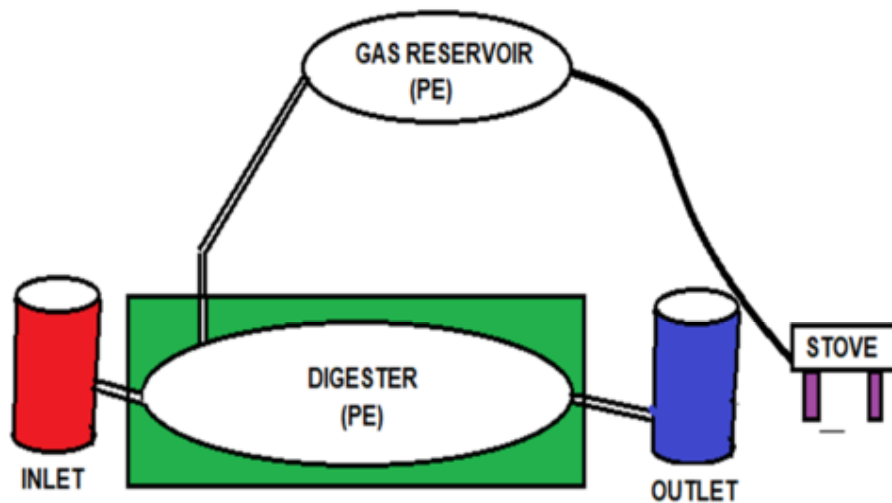


Figure 1. Biogas reactor design from polyethylene (PE) plastic bags

Before making biogas, we must first know the biogas installation model and prepare the public by conducting socialization to the public about making biogas easily and cheaply, so that the techniques and ways of making biogas can be practiced easily by the community.

Following are the steps to make biogas from PE.

1. Socialization of biogas to the community.
2. Preparation to produce infrastructure.
3. Inventory of materials and tools.
4. Material and shopping tools.
5. Collect biogas plants from PE.
6. Install the generator.
7. Make an inlet tub.
8. Manufacture of outlet tubs.
9. Make a biogas storage tank from PE.
10. Making biogas channels.
11. Install the steam trap bottle.
12. Install biogas channels to the stove.
13. Connect the biogas channel to the stove
14. Biogas stove is connected to biogas tank.
15. Stove with biogas fuel is ready to be used for cooking.
16. Conclusions.

### **CONCLUSION**

The main purpose of these tips is to guide the community and various parties involved, in developing alternative energy sources in the form of biogas made from cow dung, in realizing "Alternative energy, future fuels", in order to save costs needed for energy needs in the home stairs, by utilizing appropriate technology in the countryside. With the technique of utilizing livestock waste and "Zerro Waste" in the form of cattle dung, biogas and waste digesters can be produced that are "environmentally friendly".

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