# Analysis of the Utilization of Organic Waste into Biogas Alternative

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***Abstract*— Waste is the main problem experienced by some people in Indonesia. The population is getting higher in the span of a year. Unable with the presence of waste consisting of various types of waste, this problem can be felt, namely negative impacts on the surrounding environment, for example the slum environment, becoming a source of disease nests, and being a trigger for global warming caused by waste. This study has the aim of analyzing the use of the type of organic waste used for alternative energy, namely Biogas. In this study, we used a literature review approach. An approach similar to the one used here is used to collect various data from previously conducted research on topics related to those being discussed here. Animal waste, fruit and vegetable waste, and other forms of organic waste can be converted into biogas faster than inorganic waste. For the production of biogas, mixing vegetables together is better than cutting them. Biogas that has been processed can be used as alternative energy that can benefit various sectors. The use of organic waste into biogas can reduce the problem of waste in Indonesia.**

***Keywords— : organic waste, alternative energy, biogas, energy***

## I. INTRODUCTION

The term "waste" is used to describe the material left over from a process that is no longer needed. Since most people do not have innovative and creative ideas that make it possible to process waste and provide benefits for human life and the environment, the waste is hoarded or burned. Due to people's ignorance, waste can damage the ecosystem.

Solid waste, or solid waste, comes from various other types of waste, such as organic and inorganic waste. Liquid waste, such as laundry water, is defined as waste in the form of a liquid. Waste gases are all kinds of waste that are released into the atmosphere in the form of gases. On the basis of residual products of the original trigger. The first is the work of people in their daily lives. In this activity, it can produce various kinds of waste, for example, garbage from glasses or beverage cans. The second derived from nature is waste caused by nature itself, such as dry leaf waste. According to its nature, organic waste is waste that is easily biodegradable, and organic waste comes from animal or plant waste.

Waste has characteristics that are characteristic of waste, such as the physical, chemical, and biological properties inherent in waste [1]. The Indonesian waste management foundation said that 271,292,732 Indonesians could potentially increase the volume of waste in Indonesia in 2022, around 191 thousand tons every day. If totaled in a year, it will turn into 68 million tons. Up 2 million in 2021. When reevaluated in the context of human ingenuity, waste from landfills can take on entirely new lives. Biogas, electricity, and environmentally friendly fertilizers are just some of the energy and material products that can be made from recycled waste.

Along with the development of the economy in Indonesia, the composition of waste will change. Currently, the composition of waste in various cities in Indonesia is dominated by organic waste, the most important of which is food waste. along with the development of Biogas is one example of application in the effective use of waste. Biogas is a gas made from the fermentation activities of organic matter such as human feces of animal stsu, organic waste that is in an anaerobic state, and household waste. Biogas contains kabondioxide and methane Biogas is produced by bacteria that feed on organic waste in an oxygen-free environment. Methane and carbon dioxide make up most of the gases produced during processing and fermentation, during which the process is effective. Biogas also includes small amounts of oxygen, carbon monoxide, propane, hydrogen and hydrogen disulfide.

## II. METHODS

The literature review is just one of several methods used to collect data for this investigation. The term "literature study" refers to the process of collecting information from various related studies and analyzing the relationships between them. In literature studies, the purpose is to unite and provide information from the results of previous research with those to be studied based on existing literature. The literature review compiles the author's own summary, reviews and thoughts about the relevant work. Furthermore, descriptive analysis will be used to describe the facts at hand and explain them once again. Of the many components of this biogas, the one that can be used for fuel is methane. In the use of organic waste used as biogas will produce methane gas and it can be shown that the process in an economic way is very feasible to do [2].

## III. RESULTS AND DISCUSSION

Having enough energy to go through the day is very important. Due to dwindling energy reserves, a plan is needed to produce clean energy. Biogas energy is a type of renewable energy that is easily available. Where waste or organic waste is converted into biogas energy. Hydrolysis is the first step in the biogas production process, followed by acidogenesis, acetogenesis, and finally methanogenesis. 50–60% methane, 30–40% carbon dioxide, 0–5% nitrogen, and 0–2% hydrogen sulfide form the chemical makeup of biogas. This biogas has an energy density of 20-25 MJ / m3 and can be used for various purposes. If the methane content in biogas is more than 40%, it will be flammable and fall into the category of "good" fuel due to its high calorific value [3].



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Biogas is an alternative fuel whose manufacturing process comes from the fermentation of manure or plant residues with a vacuum and covered by the bacterium Metalothrypus Methanica. Biogas can be used as an alternative to natural gas or can be known as LPG which is starting to be difficult to obtain. The hoarding of manure around the pens is the cause of environmental pollution. This is due to the hoarding of manure of farm animals in cages. So, it is necessary to process sewage sewage In sewage treatment, biogas production from waste can be used as alternative energy [4].

According to [5] ,organic waste has the potential to be converted into biogas that can be used as renewable energy. Biogas has the potential to be used as a substitute for cooking fuel and when made on a large scale or industrially it can be used as power generation energy. Food waste and other organic matter from local markets and restaurants that have been collected in landfills can be used to produce biogas. All this scattered garbage will eventually rot and smell bad, which is very annoying. Therefore, methods to produce biogas from organic waste, vegetable waste, or other foodstuffs can help solve this problem. In the end, biogas can be converted into fuel that can be used by locals for use in stoves and other cooking utensils. First developed in the stage of decomposition of organic matter with the help of microorganisms in a vacuum or airtight, biogas technology has developed considerably since its inception The end result is a gas, consisting mainly of methane (CH4) and carbon dioxide (CO2) (carbon dioxide). Where the gas is converted into biogas, which can then be used as stove fuel to speed up the cooking process. The result of methane gas (CH4) content is produced from a mixture of substrates between wastes. Making biogas using substrates derived from oraganic waste, for example from restaurants, cow feces, and various other wastes that can pollute the surrounding environment but have the potential to be used as energy substitutes in the form of biogas [6].

Biogas, with its high methane content, has advantages that make it a worthy substitute for gasoline and LPG, as it says [7]. So that biogas can be used as cooking fuel, and its energy is used for other purposes, such as home power plants or public buildings. Biogas can also be used to drive electric generators [8]. One of the heat plants that works well for drying, power generation, and vehicle fuel is biogas. The high gas content of CH4 and the high calorific value of biogas indicate that one day biogas can function as a renewable energy source. Since each methane chain contains only one carbon, its combustion may not be very harmful to the environment. Unlike fuel oil that is burned, biogas is produced through an anaerobic process, which removes combustion fumes while still providing energy. Farmers and ranchers can benefit from this biogas because it can be produced from organic waste and manure.

The production of biogas from organic waste and cow dung is studied in the context of waste processing [9]. The results showed that converting organic waste into biogas has many advantages. There are many applications for biogas, and farmers who use it to cultivate organic crops can gain productivity and income. This is because the waste products of biogas production can be used as organic fertilizers, saving money for farmers who would otherwise have to buy expensive synthetic alternatives. Biogas has many applications in the energy industry, including as a substitute for fossil fuels in residential and commercial lighting, power generation, and transportation fuels Biogas has a number of potential environmental applications; for example, it can be used to suppress the growth of weeds, thereby reducing the need for herbicides; it can also be used to reduce the emission of bad odors; and can be converted into usable energy. Although it has the potential to be a renewable energy source, the general public is still unfamiliar with the possibility of utilizing waste or organic waste from ordinary items such as wood, leaves, and so on. Biogas, which comes from decaying organic matter, has the potential as a clean and renewable energy source. Natural organic fertilizers are another viable use for waste produced by biogas reactors. Research on community training for the production of biogas reactors reveals this [10]. With this facility, residents can recycle their organic waste into compost that can be used properly.

## IV. CONCLUSION

Conclusions are made on the basis of findings from a literature review. There are many different sectors or fields that can benefit from biogas production due to organic waste processing. For example, in the environmental field, biogas can be used as a weed control and to reduce the odor generated by compounds. In agriculture, it can be used as organic fertilizer from the rest of biogas processing, which benefits can reduce the cost of farmers in buying fertilizer from chemicals. In this energy sector, biogas is useful as energy for lighting highways or residents' homes, becoming a fuel for motor vehicles and can reduce the use of petroleum. The use of organic waste into a biogas can reduce various waste problems that are increasing if not used and can be a solution to the energy crisis problem experienced. This means that, in the long run, new methods and technologies based on various primary materials that can be renewable energy sources will be developed or introduced.

## REFERENCES


[1] Alternatif Biogas Terbarukan". Jurnal Teknologi Lingkungan Lahan Basah, 10(2), 174-183.

[2] Saptaji, K., Fikri, M. R., Hadisujoto, I. B. S., & Harjon, A. (2021). "Sosialisasi Pemanfaatan Sampah Organik Rumah Tangga Untuk Biogas Dan Pemasangan Biodigester". Jurnal Pengabdian Masyarakat Teknik, 4(1), 11-18.

[3] Damayanti, A. A., Fuadina, Z. N., Azizah, N. N., Karinta, Y., & Mahardika, I. K. (2021). "Pemanfaatan Sampah Organik Dalam Pembuatan Biogas Sebagai Sumber Energi Kebutuhan Hidup Sehari-hari". Eksergi, 17(3), 182-190.

[4] Kamandang, Z. R., Solin, D. P., & Casita, C. B. (2021). "Pemanfaatan Teknologi Biogas untuk Pengelolaan Sampah Organik". Jurnal Abdimas Teknik Kimia, 2(01), 45-49.

[5] Hasanudin, U., Nurdin, S. U., Indraningtyas, L., & Fadhallah, E. G. (2021). "Pelatihan Pemanfaatan Sampah Organik menjadi Biogas dan Pupuk Cair".

[6] Hendrasarie, N., & Edison, R. P. (2021). "Pelatihan Pembuatan Biogas Dari Limbah Rumah Makan dan Tinja". ABDIMAS UNWAHAS, 6(2).

[7] Sastrawan, S., Ridhana, F., Erita, E., & Pitriyanto, N. (2021). T"eknik Pengolahan Limbah Kotoran Sapi Bali Untuk Pembuatan Biogas Di Kampung Paya Tungel Kecamatan Jagong Jeget". JIPVET: Jurnal Ilmu Peternakan dan Veteriner, 3(2), 30-40.

[8] Rhohman, F. (2021). "Analisa Matematis Hasil Biogas Dari Sampah Sayuran Berdasarkan Perbedaan Jumlah Bahan". Jurnal Mesin Nusantara, 4(2), 84-89.




https://jurnal.polines.ac.id/index.php/eksergi

ISSN 0216-8685 (print); 2528-6889 (online)

[9] Indriyani, N., Heremba, S., Agustian, I., Salim, M., Ma'arif, S., Resky, I., & Panjaitan, T. (2022). "Pemanfaatan Kotoran Ternak Sebagai Biogas Dan Pupuk Organik Di Desa Klasmelek". Jurnal Abdimasa Pengabdian Masyarakat, 5(1), 69-74.

[10] Pranata, I. W. D. E., Dantes, K. R., & Wiratmaja, I. G. (2020). "Rancang Bangun Reaktor Pengolah Limbah Organik Menjadi Biogas Sebagai Bahan Bakar Alternatif Kendaraan Bermotor". Jurnal Pendidikan Teknik Mesin Undiksha, 8(1), 35-42.

[11] T. G. T. Nindhia, I. W. Surata, I. K. A. Atmika, D. N. K. P. Negara, and I. P. G. Artana, "Processing Carbon Rod from Waste of Zing-Carbon Battery for Biogas Desulfurizer," *Journal of Clean Energy Technologies*, vol. 3, no. 2, pp. 119–122, 2015, doi: 10.7763/jocet.2015.v3.179.

[12] T. G. T. Nindhia, I. W. Surata, and R. Antara, "Pemanfaatan Limbah Cangkang Tiram Untuk Memurnikan Biogas Dari Pengotor Karbondioksida," *Buletin Udayana Mengabdi*, vol. 16, no. 1, pp. 128–132, 2017.

[13] Von Mitzlaff, K. (1988). *Engines for biogas*. Deutsche Zentrum fur Entwicklungstechnologien..

[14] Zabed, H. M., Akter, S., Yun, J., Zhang, G., Zhang, Y., & Qi, X. (2020). Biogas from microalgae: Technologies, challenges and opportunities. *Renewable and Sustainable Energy Reviews*, *117*, 109503.

[15] Zheng, Y., Zhao, J., Xu, F., & Li, Y. (2014). Pretreatment of lignocellulosic biomass for enhanced biogas production. *Progress in energy and combustion science*, *42*, 35-53.



https://jurnal.polines.ac.id/index.php/eksergi

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