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THE DEVELOPMENT OF HOUSEHOLD-SCALE BIOGAS TECHNOLOGY FROM ORGANIC WASTE IN LASAH VILLAGE, KARANGPLOSO DISTRICT

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ABSTRACT

Climate change and limited conventional energy resources have pushed to utilize renewable energy. One of them is the development of household-scale biogas technology from organic waste. This Community Service Study (PKM) aims to document and analyze the socialization process of household-scale biogas applications in Lasah Village, Karangploso District, Kab. Poor. The activities carried out are, socialization about the benefits of biogas, the production process, and the operation of the system. Community involvement from the planning stage to implementation. The impact of socialization is assessed through surveys, interviews and observations of community participation and understanding. The study results show an increase in public understanding of the benefits of using biogas and a positive response to socialization and public interest in adopting this technology. It can be concluded that the socialization of the use of biogas technology on a household scale has been well received. Collaboration between researchers and the community can overcome communication barriers and provide practical guidance on the implementation of biogas technology. Although there is still a way forward in terms of system maintenance and management, this initial step provides a strong foundation for further development. It is hoped that this study will provide valuable insights for similar efforts in other areas, as well as encourage the implementation of sustainable technology for a brighter future.

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Keywords: Biogas, Organic Waste, Renewable Energy.

INTRODUCTION

Utilization of renewable energy sources has become the main focus in efforts to maintain environmental balance and meet sustainable energy needs in various communities (Kamalimeera & Kirubakaran, 2021). In this context, the development of biogas technology has emerged as an attractive and potential solution to reduce the negative impacts of the use of fossil fuels and unutilized organic waste. Biogas, as a product of microbial decomposition of organic matter, not only produces clean energy in the form of methane gas, but also has the potential to reduce greenhouse gas emissions and overcome waste management problems (Pilloni et al., 2020).

One important step in adopting biogas technology is through effective outreach to the community, especially on a household scale (Heriyanti et al., 2022). This outreach plays an important role in increasing public understanding and awareness about the benefits and how to use biogas applications on a household scale (Desromi et al., 2021; Hendrasarie & Rp, 2021; Zahra et al., 2023). Villages, as the most basic unit of society, have a strategic role in encouraging the adoption of this technology, considering the potential for

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organic waste that can be utilized and local energy needs that can be met (Luo et al., 2020).

It is in this context that the Community Service (PKM) journal aims to detail the process and results of efforts to socialize biogas applications on a household scale in villages. A deeper understanding of the challenges, opportunities and impacts of introducing biogas technology at the community level will be provided through a collaborative approach between researchers, practitioners and local communities. Through this journal, it is hoped that a comprehensive picture will be drawn about the socialization process, community response, and the potential for sustainable application of biogas technology in a rural context.

The importance of cross-sector collaboration and active community participation in dealing with energy and environmental problems will be emphasized in this journal. It is hoped that the results of this research can provide practical guidance for efforts to disseminate biogas technology at the village or similar community level, as well as provide valuable insight for further development in the field of renewable energy and environmental management (Abdila et al., 2020).

From the description above, it is known that the aim of this research is to develop household-scale biogas technology from organic waste in Lasah village, Karangploso district.

METHOD OF EXECUTION

This Community Service Study (PKM) was carried out through a series of structured steps to facilitate the socialization of household scale biogas applications in Lasah Village. The implementation method used includes the planning stages, implementation of socialization, and impact evaluation. The following are details of the steps taken in carrying out this study:

1. Planning includes identifying target villages, needs analysis and socialization design.
2. Implementation of socialization includes collecting socialization materials, training/workshops, and practical demonstrations and integrated manufacturing training in manufacturing and utilization techniques.
3. Impact evaluation using interviews and field observations, and data analysis.
4. Documentation and Dissemination includes preparing reports and presenting results.

Through this method, it is hoped that this PKM study can achieve valid and useful results in describing the effectiveness of socialization of household-scale biogas applications in villages and its impact on community understanding and participation.

RESULT AND DISCUSSION

The development of household-scale biogas technology from organic waste in Lasah Village has had a positive impact on several aspects of community life. The research results show that this biogas technology can produce a sustainable energy source that can be used for cooking and electricity on a household scale. There are 15 residents of Lasah Village who have received training and outreach and are ready to apply biogas in their households, as shown in Figure 1. This helps reduce dependence on fossil fuels and contributes to meeting energy needs at the household level.

The activities related to the socialization and training on biogas technology development in Lasah Village encompass a series of steps aimed at providing comprehensive understanding to the community. The socialization begins with an introduction to biogas, its benefits, and the program's objectives. Experts deliver presentations on the fundamental principles of biogas technology and its components, addressing participants' questions during discussion sessions. Subsequently, participants embark on field visits to existing biogas sites for practical insights. In the training phase, participants are instructed in the safe installation, maintenance, and operation of biogas systems.

They also gain knowledge about regular monitoring and system maintenance, as well as the potential for community empowerment through biogas utilization. Training includes practical trials to ensure participants acquire the necessary skills. All these activities are designed to encourage biogas technology adoption, enhance community knowledge, and empower

individuals to independently use and maintain biogas systems.

Figure 1. Socialization and training on biogas technology development in Lasah Village

The use of organic waste in the form of cow dung and organic waste from harvest waste by the people of Lasah Village as raw materials. This biogas technology has helped reduce the problem of organic waste in Lasah Village so that it can reduce the impact of environmental pollution. Decomposing this organic waste into biogas can also reduce methane gas emissions, which is a greenhouse gas that has the potential to cause climate change (Rosyadah et al., 2023; Vendoti et al., 2021). Apart from socialization, integrated nature creation training was also carried out as shown in **Figure 2** below.

Figure 2. Organic waste found in Lasah Village

The development of this technology also has a positive impact on empowering local communities. The people of Lasah Village who are involved in using this technology become more independent in meeting their household energy needs. In addition, knowledge and skills in the operation and maintenance of biogas digesters have also increased. It is hoped that technology development for the people of Lasah Village who have received training in biogas socialization will become pioneers in utilizing biogas from organic waste in the village. Based on the evaluation results after carrying out integrated socialization and training, it was found that 20% (3 people) of the participants were willing to become pioneers in the development of biogas technology. Based on the evaluation results after socialization and training to participants, it showed that 95% (13 people) understood the material and training that had been provided.

However, there are several challenges that may be faced in developing household-scale biogas technology, namely further education and training in terms of maintaining the biogas digester which must be more intensive in the long term. In addition, the continuous and sufficient availability of organic waste is an important factor in biogas production. Planting and harvest seasons in agriculture in Lasah Village can influence the availability of raw materials.

CONCLUSION

The development of household-scale biogas technology from organic waste in Lasah Village provides significant benefits in terms of sustainable energy, environmental

benefits and community empowerment. However, efforts to overcome technical and social challenges need to continue to ensure the sustainability and effectiveness of this technology in the long term. With the right support, biogas technology can be a sustainable solution in meeting energy needs at the household level while reducing negative environmental impacts.

Author's declaration

Authors' contributions and responsibilities

The authors made substantial contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

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Availability of data and materials

All data are available from the authors.

Competing interests

The authors declare no competing interest.

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