



Tropentag, September 9-11, 2020, virtual conference

“Food and nutrition security and its resilience
to global crises”

Sociotechnical and Socioeconomic Constraints on Adoption of Small-Scale Biogas Plants in Indonesia: A Review

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Abstract

The growing interest around the world for renewable energy to avoid climate change has increased demands for cleaner energy sources. Biogas in particular as an alternative energy source is not only sustainable but also offering economic, social, and environmental benefits. Currently, Indonesia has installed 43,896 biogas digesters in the past 10 years. This is quite low because biogas technology has been introduced since the 1970s and Indonesia has a great potential for adopting the technology. Challenges in developing this technology still depend on external financial support and its competition with non-renewable energy. Likewise, the technical installation and maintenance of biogas plants are poor due to the lack of knowledge and skills of biogas users. Early identification of barriers further helps to develop a rigorous approach in developing and implementing biogas technology in rural areas. These barriers identified individually for rural biogas systems and the results show that the type of barriers varies strongly between biogas systems due to the difference in technology maturity, feedstock availability and quality, supply chain, awareness level, and policy support. Therefore, it is very important to develop a mechanism that entails sociotechnical and socioeconomic perspectives. This paper explored the potential of biogas to help meet domestic energy needs and to comply with Indonesia's climate mitigation commitments and development planning. By analysing the previous literature on sociotechnical and socioeconomic constraints of the adoption of biogas in Indonesia, this paper provides an overview of the adoption of the technology that could lead to self-sufficiency in household energy provision for rural energy needs. In the future, their impact able to facilitate environmental management and economic development in Indonesia. This review highlights the need for support from central and local governments, NGOs and private sectors to better deliver the scheme without forgetting the proper training for technical maintenance. Cooperation between stakeholders needs to improve in order to increase the quality and quantity of biogas technology dissemination.

Keywords: adoption, constraints, Indonesia, small-scale biogas technology, socioeconomic, sociotechnical