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Energy Audit in Tofu Industry: Evidence from Indonesia

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Abstract

Tofu industry production in Indonesia is generally producing on small- and medium scale levels, which requires a lot of energy inputs in the production process. In general, the fuels used are not environmentally friendly, such as firewood and liquid petroleum gas (LPG). In addition, the tofu industry also uses large amounts of water for the production process, generate wastewater in large quantities. It is resulting in significant negative effects on the environment. Therefore, it is necessary to study the process systematically and propose ways how to overcome it. This study aimed to audit the energy consumption to obtain the energy consumption and the habits of small and medium-scale level tofu producers. The data collection method involved semi-structured interviews and questionnaire surveys carried out in 31 tofu industries in Gunung Sulah District, Bandar Lampung City, Lampung Province, Indonesia, in December 2020. The results showed that energy consumption varies according to the fuel used within the tofu cooking (boiling the soybean and frying tofu) on average; 71.05 MJ kg^{-1} for fuelwood, 16.95 MJ kg^{-1} for LPG, and 6.02 MJ kg^{-1} for wood pellets. The fuel, gasoline or diesel, consumed for milling depend on the type of milling machine used. The gasoline consumption is 1.94 MJ kg^{-1}, and the diesel is 3.22 MJ kg^{-1}. The tofu industry has high energy requirements in the production process. Total energy consumption in tofu industries is 69.33 MJ/Kg, consisting of energy for cooking 66.64 MJ/Kg, soybean milling machine 2.39 MJ kg^{-1}, utilities (electricity) 0.20 MJ kg^{-1}, and human energy 0.11 MJ kg^{-1}. The results of the energy audit make tofu maker aware that the use of energy for the production process is inefficient and not environmentally friendly. Therefore, it is necessary to carry out energy audits more deeply to utilise the wastewater as material for bioenergy, such as biogas to replace the primary fuels.

Keywords: Biogas , energy consumption, tofu industry, wastewater

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