



Application of Energy Return on Investment (EROI) Analysis to Biogas Production

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Abstract: Energy plays a vital role to the industry of developing countries. Producing clean renewable energy is one way of mitigating the effects of pollution generated by the industry in using conventional fossil fuels. Biogas is a renewable fuel which can be produced anaerobically using agricultural waste and food waste materials. A net energy analysis is one way of assessing the quality of different fuels by accounting the differences between the energy conveyed to society and the energy endowed. This system will help to analyze the flow of energy in a society associated with the growth. This paper presents the results of the application of Energy Return on Investment (EROI) analysis in the biogas production of Jatropha press-cake (JPC) and Pig manure (PM). Jatropha press-cake used in the biogas production was taken as a by-product from the biodiesel production. The EROI indicator was used in this study to provide a numerical quantification on the pathways being compared in utilizing Jatropha press-cake as feedstock for renewable energy generation. The analyses of EROI were able to assess the different substrate mixture ratio used in the biogas production whether it is viable or not. A comparison of EROI analysis between biogas production and thermal gasification were also undertaken in order to assess its viability as a feedstock for renewable energy generation. Results show that utilizing the Jatropha press-cake as feedstock for thermal gasification is much better than biogasification. However, it should be made clear that the by-product of biogas production was not covered in the analysis of EROI. A further study of the EROI analysis on the biogas by-product is recommended for future investigation.

Key Words: EROI; Net Energy; Biogas; Renewable Energy; Thermal Gasification