Techno – Economic Analysis of Biodigester Utilization As a Substitute For Household LPG In Tegal Mulyo Hamlet, Bungatan District

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ABSTRACT

The use of Liquefied Petroleum Gas (LPG) as a household fuel remains dominant, particularly in rural areas. Limited distribution and increasing LPG prices have encouraged the utilization of alternative, affordable, and environmentally friendly energy sources. One potential alternative energy source is biogas produced from cattle manure. Tegal Mulyo Hamlet, Bungatan District, Situbondo Regency has significant cattle manure potential that has not been optimally utilized. This study aims to analyze the biogas potential from cattle manure and to evaluate the techno-economic feasibility of using a biodigester as a substitute for household LPG. The research method employed is a literature studies, field surveys, and secondary data analysis obtained from published Student Creativity Program (PKM) journals with similar biodigester specifications. Economic feasibility analysis was conducted using Net Benefit-Cost Ratio (Net B/C), and Payback Period (PBP) methods. The results indicate that a 1 m^3 capacity biodigester can produce 8.65 m^3 of biogas per day, equivalent to 3.9 kg of LPG per day or approximately 468 cylinders of 3 kg LPG per year. Economically, the use of a biodigester provides annual LPG cost savings of IDR 9,360,000. The economic feasibility analysis yields an NPV of IDR 29.029.855, a Net B/C ratio of 4,23 and a Payback Period of 11.9 months.

Keywords*: biogas, biodigester, techno-economic analysis, LPG, alternative energy*