

## **ABSTRACT**

### **GREENHOUSE GASES EMISSION REDUCTION POTENTIAL OF FAMILY SIZE BIOGAS PLANT APPLICATION USING COW DUNG IN LAMPUNG PROVINCE**

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The process of anaerobic degradation of organic matter produces biogas which can be used as fuel and residues as organic fertilizer. This process also provides great opportunities in efforts to reduce greenhouse gas (GHG) emissions through the substitution of LPG for cooking and organic fertilizer. This study aimed to 1) assess the performance of the biogas digester based on the value of TS, VS, COD, biogas production and biogas composition and 2) calculate the potential reduction of GHG emissions using household-scale biogas digesters in Lampung province by using cow dung.

This research was conducted using two types of household biogas digesters, namely balloon type digester and fixed dome digester. Two fixed dome digesters located in Pesawaran Indah Village, Subdistrict of Padang Cermin, District of Pesawaran and two balloon type digester located in Marga Lestari Village, Subdistrict of Jati Agung, District of South Lampung. Daily production of biogas was measured by using a U type water manometer. Biogas composition ( $\text{CH}_4$ ,

CO<sub>2</sub>, and N<sub>2</sub>) was analyzed by using Gas Chromatography (GC 2014 Shimadzu). The values of TS and VS were measured using a Memmert oven and 1300 Barnstead Thermolyne furnace. While HACH DR 4000 spectrophotometer was used to analyse COD.

The results showed that the degradation rate of TS, VS and COD were 38,62%, 30,69%, and 50,9% respectively. Daily production of biogas was 1543 liters equivalent to 240,7 kg of LPG saving per year. Biogas composition including CH<sub>4</sub>, CO<sub>2</sub> and N<sub>2</sub> were respectively about 53,61%, 31,35% and 15,04 %.

Furthermore, 6482,4 kg of slurry which is equivalent to 90,8 kg N, 71,3 kg P and 51,9 kg K can be used as organic fertilizer. A household biogas digester had a GWP reduction value of 7314,3 kg of CO<sub>2</sub> equivalence. This meant that GWP reduction value by applying family size biogas digester throughout Lampung province was about 1,4 million tonnes of CO<sub>2</sub> equivalence, equal to 17,73% of national GHG emission reduction targets from only agricultural sector.

*Keywords: emissions, greenhouse gasses, biogas, cow dung, GWP.*