

## **ANALISIS TEKNIS PENGARUH *HYDRAULIC RETENTION TIME* TERHADAP PRODUKTIVITAS BIOGAS DAN KELAYAKAN EKONOMI TIPE DIGESTER *FIBERGLASS FIXED DOMED* SKALA RUMAH TANGGA**

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### **INTISARI**

Biogas merupakan salah satu sumber energi terbarukan yang dapat menjawab kebutuhan energi alternatif. Biogas dapat dihasilkan dari limbah rumah tangga, kotoran hewan, kotoran manusia, dan sampah organik yang mengalami proses fermentasi oleh mikroorganisme secara *anaerob*. Untuk menghasilkan biogas dibutuhkan reaktor biogas kedap udara sehingga proses pembentukan biogas dengan cara dekomposisi bahan organik biogas dapat berjalan secara optimum. Salah satu faktor penting dalam pembentukan biogas yaitu laju masukan pada sistem pengisian dalam mempengaruhi jumlah kandungan substrat tercemar menjadi gas metana ( $\text{CH}_4$ ). laju masukan berkaitan dengan faktor pembentukan biogas yaitu *hydraulic retention time (HRT)* atau lama umur bahan fermentasi dalam digester dan kapasitas volume digester.

Metode pengisian yang digunakan adalah *continues feeding* ke dalam digester. Penelitian ini dilakukan dua kali percobaan dengan masing-masing pengamatan 32 hari di Pondok Pesantren Sabilul Huda Desa Pakembinangun, Pakem, Sleman. Perlakuan pertama dilakukan laju masukan 200 liter/hari dengan pencampuran 50 kg kotoran sapi dan 150 liter air. Percobaan kedua dilakukan laju masukan 120 liter/hari dengan pencampuran 30 kg kotoran sapi dan 90 liter air. Berdasarkan hasil percobaan dan analisis, didapatkan perlakuan pertama menghasilkan rerata volume biogas sebesar  $0,472 \text{ m}^3$  dan perlakuan kedua sebesar  $0,441 \text{ m}^3$ . Namun berdasarkan produktivitas biogas perlakuan kedua lebih tinggi dari perlakuan pertama, pada perlakuan pertama sebesar  $9,45 \text{ m}^3/\text{kg}$  dan perlakuan kedua sebesar  $14,68 \text{ m}^3/\text{kg}$ . Berdasarkan analisis kelayakan ekonomi metode *Net Present Value (NPV)* diperoleh sebesar Rp 4.337.755,86 Pada metode *Benefit Cost Ratio (BCR)* didapatkan nilai sebesar 2,01. Berdasarkan nilai *NPV* dan *BCR* tersebut, artinya sudah layak untuk dikembangkan secara ekonomi skala rumah tangga.

**Kata Kunci: Biogas, Kotoran Sapi, Laju masukan, Produktivitas**

## **TECHNICAL ANALYSIS OF EFFECT HYDRAULIC RETENTION TIME TO BIOGAS PRODUCTIVITY AND ECONOMIC FEASIBILITY OF FIBERGLASS FIXED DOMED TYPE OF BIOGAS DIGESTER ON HOUSEHOLD SCALE**

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### **ABSTRACT**

Biogas is a renewable energy source who can answer needs alternative energy. Biogas can be produced from household waste, animal waste, human waste, and organic waste which undergoes a fermentation process by microorganisms anaerobically. To produce biogas, needs an airtight biogas reactor so the process of making biogas by decomposition the organic matter can optimally. One important factor in the making of biogas is feeding rate in the filling system in influencing the amount of content of the contaminated substrate to methane gas (CH<sub>4</sub>). Feeding rate related with factor making of biogas are hydraulic retention time (HRT) or fermentation time in digester and digester capacity.

The charging method which is used in this research is called Continues Feeding into the digester. This research was conducted on two attempts with 32 observations each at Sabilul Huda Islamic Boarding School in Pakembinangun Village, Pakem, Sleman. The first experiment was feeding rate 200 liters/day by mixing 50 kg of cow dung and 150 liters of water. The second experiment was conducted feeding rate 120 liters/day by mixing 30 kg of cow dung and 90 liters of water. Based on the results of experiments and analysis, was conducted the first experiment resulted average of volume biogas is 0,472 m<sup>3</sup>, and the second experiment is 0,441 m<sup>3</sup>. Based on the productivity of biogas, the second experiment is higher than the first experiment, on the first experiment is 9,45 m<sup>3</sup>/kg dan second experiment is 14,68 m<sup>3</sup>/kg. Based on a feasibility analysis, with Net Present Value (NPV) obtained the NPV value is Rp Rp 4.337.755,86. On the method Benefit Cost Ratio (BCR) obtained the BCR value is 2,01. Based on NPV dan BCR values, meaning that it is not yet feasible to develop economically on a household scale.

**Keywords: Biogas, Cow dung, Feeding rate, Productivity**