Studi Kinerja Syngas Hasil Gasifikasi Sampah Sebagai Bahan Bakar Generator Set Diesel = Performance Study of Syngas from Waste Gasification as Fuel for Diesel Generator Set

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Abstrak

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Di Indonesia, permasalahan sampah menjadi perbincangan dari hulu ke hilir yang terus dicari pemecahannya. Sampah kota di Indonesia memiliki potensi sebagai sumber energi terbarukan yang cukup besar. Namun, belum ada pemanfaatan secara maksimal karena terkendala aspek teknologi dan ekonomi. Teknologi pengolahan sampah menjadi listrik dengan metode landfill gas to power membutuhkan lahan yang besar untuk bisa menampung sisa tumpukan sampah. Dengan latar belakang dan potensi tersebut, pengujian ini bertujuan untuk membandingkan kestabilan tegangan dan frekuensi serita kinerja mesin dari generator set mesin diesel berbahan bakar solar yang dicampur syngas hasil gasifikasi sampah dan dibandingkan dengan solar murni pada skenario pembebanan 6,66%, 13,33%, dan 20%. Pengujian bahan bakar solar dengan campuran syngas mampu mempertahankan kinerja mesin diesel dengan kestabilan tegangan di antara +0,7%-+4,6% dari nilai nominal, kestabilan frekuensi di antara -1,26%-+1,34% dari nilai rata-rata, konsumsi bahan bakar 15,7 m3 syngas setara dengan 1 liter solar, tingkat kebisingan pada jarak 1 meter sebesar 76,28 dB-81,96 dB, dan suhu gas buang di antara 100,42-21,80 derajat celcius.
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<i>ABSTRACT
In Indonesia, the problem of waste becomes a conversation from upstream to downstream that the solution is continuously sought. Municipal Solid Waste (MSW) in Indonesia has the potential as a source of renewable energy that is quite large. However, there has not been a maximum utilization due to technological and economic aspects. The technology of processing waste into electricity using the landfill gas to power method requires a large amount of land to be able to accommodate the remaining piles of garbage. As that background and potential, this analysis aims to compare the stability of the voltage and frequency as well as the performance of the engine from diesel engine generator sets which the diesel fuel mixed with syngas from waste gasification results and compared to pure diesel in the loading scenario of 6.66%, 13.33%, and 20%. Testing diesel fuel with syngas mixture is able to maintain the performance of diesel engines with voltage stability between +0.7%-+4,6% of the nominal value, frequency stability between-1.26%+1.34% of the average value, fuel consumption of 15.4 m3 syngas is equivalent to 1 liter of diesel, the noise level at 1 meter is 76.28 dB 81.96 dB, and the temperature of the exhaust gas is between 100.42 121.80 celcius degree.<i/>