Studi performa dan keekonomian pembangkitan listrik pada generator set diesel berbahan bakar crude palm oil (CPO) = Performance and economics study of power generation in generator set diesel using crude palm oil (CPO)

Doni Kurniawan, author

Abstrak

Indonesia merupakan produsen Crude Palm Oil (CPO) terbesar di dunia dengan produksi sebesar 26,5 juta ton (55,5%) pada tahun 2013 (GAPKI, 2014). Pusat-pusat produksi CPO berada di pulau Sumatera dan Kalimantan yang juga merupakan penghasil minyak bumi dan gas. Namun demikian pada kedua pulau tersebut justru mengalami defisit listrik selama satu dekade terakhir.
Hasil penelitian menunjukkan bahwa parameter uji berupa efisiensi thermal, daya, tegangan, frekuensi, dan respon terhadap perubahan beban untuk komposisi bahan bakar CPO murni (CPO100) maupun campuran (CPO25 dan CPO75) terhadap solar tidak memiliki perbedaan yang signifikan, sehingga CPO layak menggantikan peran solar sebagai bahan bakar generator set diesel pada komposisi dan suhu tertentu. Konsumsi bahan bakar berturut-turut Solar100 (414,85 gr/kWh), CPO25 (495,19 gr/kWh), CPO100 (522,24 gr/kWh) dan CPO75 (528,41 gr/kWh). Biaya perolehen energi listrik dihitung melalui Unit Cost of Electricity (COE) berturut-turut CPO100 (Rp. 5.772,17/kWh), CPO75 (Rp. 6.615,52/kWh), Solar100 (Rp. 7.158,43/kWh) dan CPO25 (Rp. 7.754,26/kWh). Hasil analisa sensitivitas COE menunjukkan Fuel Price memiliki pengaruh yang sangat kuat terhadap perubahan nilai COE
.....Indonesia is a crude palm oil (CPO) producer in the world with a production of 26.5 (55.5%) million tonnes in 2013 (GAPKI, 2014). CPO production centers located on the island of Sumatra and Kalimantan, which is also a center of oil and gas production. However, the two islands had power deficit during the last decade.
Based on the research, the test parameters such as thermal efficiency, power, voltage, frequency, and response to changes in the composition of the fuel load for pure CPO (CPO100) or mixed (CPO25 and CPO75) against solar does not have significant differences, so that the CPO worthy of replacing the role diesel as fuel for diesel generator sets for certain composition and temperature.
SFC value respectively Solar100 (414,85 gr/kWh), CPO25 (495,19 gr/kWh), CPO100 (522,24 gr/kWh) and CPO75 (528,41 gr/kWh). The cost for producing electrical energy is calculated by Unit Cost of Electricity (COE) respectively CPO100 (Rp. 7.689,47/kWh), CPO75 (Rp. 8.532,82/kWh), Solar100 (Rp. 8.847,41/kWh) and CPO25 (Rp. 9.291,03/kWh). The sensitivity analysis shows that the Fuel Price has a very strong influence on the change in value of COE.