

ABSTRAK

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Program Studi : S2-Teknik Elektro
Judul Tesis : Analisis Komparatif Pengaruh Komposisi Material Organik Dan Non-Organik Terhadap Potensi Energi Pelet *Refuse Derived Fuel* (Rdf) Sebagai Bahan Bakar Sistem *Waste To Energy* (Wte) Untuk Pembangkitan Energi Listrik

Peningkatan volume sampah mendorong pengembangan teknologi *Waste to Energy* (WTE) sebagai sumber energi alternatif. *Refuse Derived Fuel* (RDF) dalam bentuk pelet merupakan salah satu bahan bakar yang berpotensi dimanfaatkan pada sistem pembangkitan energi listrik. Penelitian ini bertujuan menganalisis pengaruh variasi komposisi material organik dan non-organik terhadap karakteristik energi pelet RDF serta menentukan komposisi optimalnya. Sampel pelet RDF dibuat dengan variasi komposisi material organik sebesar 60%, 70%, 80%, 90%, dan 100%. Pengujian karakteristik bahan bakar dilakukan melalui analisis proksimat dan pengujian nilai kalor (*Gross Calorific Value*). Data dianalisis menggunakan pendekatan regresi untuk mengetahui hubungan antara komposisi material dan potensi energi bahan bakar. Hasil penelitian menunjukkan bahwa komposisi material berpengaruh signifikan terhadap kualitas energi RDF. Komposisi 70% organik dan 30% non-organik menghasilkan nilai kalor tertinggi sebesar 6138 kkal/kg. Peningkatan fraksi organik di atas 80% menyebabkan penurunan nilai kalor hingga 3008 kkal/kg. RDF campuran organik dan non-organik berpotensi digunakan sebagai bahan bakar alternatif pada sistem WTE untuk pembangkitan energi listrik.

Kata kunci: Refuse Derived Fuel (RDF), Waste to Energy (WtE), Pelet RDF, Nilai Kalor, Energi Alternatif

ABSTRACT

Name : Fasharani Fahmi Fauzian
Studi Program : *Master's in Electrical Engineering*
Thesis Title : *Comparative Analysis on the Effect of Organic and Non-Organic Material Composition on the Energy Potential of Refuse Derived Fuel (RDF) Pellets as Fuel for Waste to Energy (WTE) Systems for Electricity Generation*

The increasing volume of municipal solid waste has encouraged the development of Waste to Energy (WTE) technology as an alternative energy source. Refuse Derived Fuel (RDF) pellets have significant potential as fuel for electricity generation systems. This study aims to analyze the effect of organic and inorganic material composition on the energy characteristics of RDF pellets and to determine the optimum composition. RDF pellet samples were prepared with organic material compositions of 60%, 70%, 80%, 90%, and 100%. Fuel characteristics were evaluated using proximate analysis and Gross Calorific Value (GCV) testing. Regression analysis was applied to determine the relationship between material composition and fuel energy potential. The results show that material composition significantly influences RDF energy quality. The composition containing 70% organic and 30% inorganic materials produced the highest calorific value of 6138 kcal/kg. Increasing the organic fraction above 80% reduced the calorific value to 3008 kcal/kg. Mixed organic–inorganic RDF pellets demonstrate strong potential as an alternative fuel for WTE-based electricity generation systems.

Keywords: *Refuse Derived Fuel (RDF), Waste to Energy (WtE), RDF Pellets, Calorific Value, Alternative Energy*