INTISARI

Potensi limbah biomassa kelapa sawit cukup melimpah utamanya di Kabupaten Mamuju Utara Provinsi Sulawesi Barat, Indonesia. Kebijkan energi nasional pemerintah Indonesia dalam menekan penggunaan energi fosil dan beralih ke energi terbarukan (*renewable energy*) dengan memanfaatkan sumber daya alam secara efisien dan berkelanjutan. Salah satu sumber daya alam yang dapat dimanfaatkan tersebut ialah limbah kelapa sawit menjadi produk biobriket dengan memadukan komposisi campuran dari limbah kelapa sawit.

Tujuan penelitian ini ialah untuk untuk mengetahui peningkatan nilai kalor dan mencari kualitas terbaik yang sesuai dengan standar briket nasional, dari produk briket limbah kelapa sawit (pelepah, tandan kosong, dan cangkang) berdasarkan ukuran partikel, komposisi campuran dan tekanan serta untuk membuat analisis teknologi dan ekonomi limbah kelapa sawit (pelepah, tandan kosong, dan cangkang) menjadi briket.

Metode pada penelitian ini dengan menggunakan rancangan acak lengkap pada berbagai perlakuan komposisi bahan baku, ukuran bahan baku, dan tekanan yang berbeda. Rasio komposisi bahan baku yaitu, cangkang: tandan: pelepah (50 % : 25 % : 25 %), (25 % : 50 % : 25 %), (25 % : 25 % : 50 %) ukuran bahan baku -40 *mesh*, dan -40+60 *mesh*, tekanan pengempaan pada 70 kg/cm², 105 kg/cm². Selanjutnya melakukan analisis proksimat (kadar air, kadar volatil, kadar abu, kadar zat mudah terbang, kadar karbon terikat), nilai kalor, berat jenis, dan laju bakar, serta melakukan analisis kelayakan ekonomi menggunakan parameter NPV, IRR, ROI, Payback period (PP).

Hasil pengujian briket terbaik adalah sampel (A2B3C2) komposisi bahan baku cangkang 50 % : pelepah 25 %, tandan 25 %, ukuran partikel -40+60 *mesh*, dan tekanan 105 kg/cm², menghasil kadar air 6,55 %, kadar volatil 64,81 %, kadar abu 2,33, kadar karbon 26,29 %, nilai kalor 4.869,8 kal/g, berat jenis 0,51 kg/m³. Tetapi, harga bahan bakunya lebih mahal dan keuntungan lebih kecil. Sehingga alternatif yang dipilih adalah sampel (A2B1C2) rasio komposisi bahan baku (pelepah 50 % tandan 25 %: cangkang 25%) ukuran partikel -40+60 *mesh*, dan tekanan 105 kg/cm², menghasil kadar air 5,16 %, kadar volatil 67,26 %, kadar abu 2,87, kadar karbon 24,70%, nilai kalor 4.813,55 kal/g, berat jenis 0,51 kg/m³. Nilai NVP yang didapatkan ialah Rp. 7.684.877.021, IRR sebesar 52,99%, ROI sebesar 29,99%, Payback period (PP) 3,33 tahun, yang memiliki nilai kalor cukup tinggi, kadar air yang rendah, serta harga bahan baku yang murah. Oleh karena itu, hasil dari analisis produksi briket limbah biomassa layak secara ekonomi dan layak dijadikan sebagi sumber energi terbarukan.

Kata kunci: Limbah kelapa sawit, briket biomassa, tekno ekonomi briket, briket, pelet biomassa, energi terbarukan, kelayakan ekonomi.

ABSTRACT

The potential of oil palm biomass waste was quite abundant especially in North Mamuju Regency, West Sulawesi Province, Indonesia. The Indonesian government's national of energy policy was suppressing fossil energy and turning to renewable energy by utilizing natural resources efficiently and sustainably. One of the natural resources that can be utilized was palm oil waste to be a bio briquette product by combining the composition of the mixture from palm oil waste.

The purpose of this study was to determine the increase in calorific value and look for the best quality in accordance with world pellet standards, from palm oil bricket products (frond, empty bunches, and shells) based on particle size, mixture composition, and pressure and with technological and economical analyzes palm oil waste (frond, empty bunches and shells) becomes brickets (pellets).

The method in this study was using a completely randomized design on various treatments of composition of raw materials, raw material sizes, and different pressures. The composition ratio of raw materials were palm shells: bunches: fronds (50%: 25%: 25%), (25%: 50%: 25%), (25%: 25%: 50%) with size of raw material -40 mesh and -40+60 mesh, pressuring pressure at 70 kg / cm² and 105 kg / cm². Furthermore, it was doing the proximate analysis (water content, volatile content, ash content, levels of easy-to-fly substances, bound carbon content), calorific value, specific gravity and fuel rate. After that, an economic feasibility analysis was carried out using NPV, IRR, ROI, Payback period (PP) parameters.

The results of the best briquette testing were samples (A2B3C2) with ratio of 50% palm shell: 25% frond, 25% bunches, -40 + 60 mesh particle size, and 105 kg / cm² pressure, 6,55% moisture content, 64,81% volatile content, ash content of 2,33, carbon content of 26.29%, heating value of 4.869,8, specific gravity of 0,51 kg / m³. However, the price of materials was more expensive and the profits were smaller. So, we have the alternative sample (A2B1C2) with ratio 50% of frond: 25% of bunches: 25% of palm shell, -40 particle size + 60 mesh, and 105 kg / cm² pressure, produces a moisture content of 5.16%, volatile content 67.26%, ash content 2.87, carbon content 24.70%, calorific value 4,813.55, specific gravity 0.51 kg / m³. NVP obtained is Rp. 7,684,877,021, IRR of 52.99%, ROI of 29.99%, Payback period (PP) of 3.33 years, which has a sufficiently high heating value, low water content, and cheap raw material prices. Therefore, biomass waste briquette production were economically feasible and deserve to be used as a renewable energy source.

Keywords: Palm oil waste, biomass pellets, techno economy, brickets, renewable energy, economical feasible