

ABSTRAK

STUDI BIOENERGI DARI HUTAN DAERAH PERBATASAN NEGARA DESA ALAS KECAMATAN KOBALIMA TIMUR KABUPATEN MALAKA

Emilia Emilia Dahu Lau Jemmy J.S Derhan, Jonathan E Koehuan,

Desa Alas, Kecamatan Kobalima Timur, Kabupaten Malaka merupakan desa di kawasan perbatasan Indonesia–Timor Leste yang masyarakatnya masih sangat bergantung pada kayu bakar sebagai sumber energi memasak utama, namun potensi bioenerginya belum pernah dikaji secara kuantitatif. Penelitian deskriptif kuantitatif ini bertujuan mendeskripsikan karakteristik dan pola konsumsi energi rumah tangga, menganalisis akses dan persepsi masyarakat terhadap energi bersih, mengidentifikasi harapan masyarakat, mengestimasi kebutuhan bioenergi per kapita, serta menganalisis potensi penyediaan bioenergi dari sistem agroforestry lokal (Gamal dan Jati). Data dikumpulkan melalui kuesioner terhadap 40 kepala keluarga yang dipilih secara purposive sampling pada Mei–Juli 2025, kemudian dianalisis secara deskriptif. Hasil penelitian menunjukkan bahwa kayu bakar merupakan sumber energi memasak utama bagi 45,0% responden, dengan 60,0% memperolehnya dari kebun/lahan sendiri. Rata-rata pengeluaran energi rumah tangga sebesar Rp172.500/bulan. Meskipun 97,5% responden telah memiliki akses listrik, kayu bakar belum tergantikan untuk kebutuhan memasak. Kendala utama beralih ke energi bersih adalah produk yang tidak tahan lama (30,0%) dan harga mahal (20,0%), sementara harapan terbesar masyarakat adalah kemudahan memperoleh bahan bakar (30,0%) dan penghematan biaya (27,5%) — dua hal yang sejalan dengan karakteristik bioenergi berbasis kayu lokal. Estimasi kebutuhan bioenergi per kapita di Desa Alas berkisar 11,9–15,3 MJ/kapita/hari (4.344–5.585 MJ/kapita/tahun). Berdasarkan potensi produksi biomassa Gamal (7–12 ton/ha/tahun; nilai kalor 17–19 MJ/kg), satu hektar lahan agroforestry Gamal diperkirakan mampu memenuhi kebutuhan energi 3,6–8,9 rumah tangga per tahun. Temuan ini mengonfirmasi bahwa sistem agroforestry di Desa Alas memiliki potensi besar sebagai basis ketahanan energi lokal dan perlu didukung melalui pengembangan kompor biomassa hemat energi serta penguatan program agroforestry berbasis pohon energi cepat tumbuh.

Kata kunci : bioenergi, biomassa, agroforestry, energi rumah tangga, kawasan perbatasan

ABSTRAK

BIOENERGY STUDY OF THE FOREST IN THE NATIONAL BORDER AREA OF ALAS VILLAGE, EAST KOBALIMA SUB-DISTRICT, MALAKA REGENCY

Emilia E. Dahu Lau Jemmy .J.S . Dethan Jonathan . E . Koe

Alas Village, East Kobalima Sub-district, Malaka Regency is a village in the Indonesia–Timor Leste border area whose people still heavily rely on firewood as the main source of energy for cooking. However, its bioenergy potential has never been studied quantitatively. This quantitative descriptive study aims to describe the characteristics and household energy consumption patterns, analyze community access to and perceptions of clean energy, identify community expectations, estimate per capita bioenergy needs, and analyze the potential for bioenergy supply from local agroforestry systems (*Gliricidia* and Teak). Data were collected through questionnaires administered to 40 heads of households selected by purposive sampling from May to July 2025, and then analyzed descriptively. The results show that firewood is the main cooking energy source for 45.0% of respondents, with 60.0% obtaining it from their own gardens/land. The average household energy expenditure is IDR 172,500 per month. Although 97.5% of respondents have access to electricity, firewood has not been replaced for cooking needs. The main obstacles to switching to clean energy are products that are not durable (30.0%) and high prices (20.0%), while the greatest community expectations are easy access to fuel (30.0%) and cost savings (27.5%) — both of which align with the characteristics of bioenergy based on local wood. The estimated per capita bioenergy demand in Alas Village ranges from 11.9–15.3 MJ/capita/day (4,344–5,585 MJ/capita/year). Based on *Gliricidia* biomass production potential (7–12 tons/ha/year; calorific value 17–19 MJ/kg), one hectare of *Gliricidia* agroforestry land is estimated to be able to meet the energy needs of 3.6–8.9 households per year. These findings confirm that the agroforestry system in Alas Village has great potential as a basis for local energy resilience and should be supported through the development of energy-efficient biomass stoves and strengthening agroforestry programs based on fast-growing energy trees.

Keywords: bioenergy, biomass, agroforestry, household energy, border areas