

ABSTRAK

MUHAMMAD RAIHAN AZZAKY. Analisis Finansial Potensi Bisnis Program *Co-Firing* Biomassa Pada PLTU Batu Bara: Studi Kasus PLTU Kapasitas 315 MW Di Pulau Jawa. Dibimbing oleh Dr. Ir. Muhammad Ahsin Sidqi. MM., IPU., ASEAN.Eng., QRGP

Program *co-firing* biomassa merupakan strategi transisi energi yang didorong pemerintah Indonesia untuk mengurangi emisi karbon pada Pembangkit Listrik Tenaga Uap (PLTU) guna mencapai target Net Zero Emission 2060. Penelitian ini bertujuan untuk menganalisis kelayakan finansial dan potensi bisnis penerapan *co-firing* pada PLTU berkapasitas 315 MW dengan membandingkan skenario rasio biomassa 0% (base case), 5%, dan 10%. Metode penelitian yang digunakan adalah kuantitatif deskriptif untuk menghitung *Levelized Cost of Electricity* (LCOE), *Net Present Value* (NPV), *Internal Rate of Return* (IRR), dan *Payback Period*. Hasil penelitian menunjukkan bahwa implementasi *co-firing* 10% yang dimulai pada tahun ke-10 operasional mampu menurunkan LCOE menjadi 6,16 sen USD/kWh, lebih efisien dibandingkan skenario base case sebesar 6,32 sen USD/kWh. Penurunan ini didorong oleh disparitas harga energi termal biomassa yang 52% lebih rendah dibandingkan batubara. Dari sisi profitabilitas, skenario 10% memberikan kinerja keuangan terbaik dengan nilai NPV sebesar USD 102,024,976.50 dan IRR sebesar 12.84%, unggul dibandingkan operasional batubara murni yang memiliki IRR 12.53%, dengan *Payback Period* selama 5,8 tahun. Selain manfaat internal, program ini menciptakan potensi pasar (*captive market*) bagi industri penyediaan *bio-pellet* dengan estimasi pendapatan mencapai USD 7,1 Juta (setara Rp 120 Miliar) per tahun. Penelitian ini menyimpulkan bahwa *co-firing* biomassa pada rasio 10% layak diterapkan secara finansial dan strategis untuk keberlanjutan bisnis pembangkitan.

Kata kunci : Analisis Finansial, Biomassa, *Co-firing*, LCOE, PLTU 315 MW, Potensi Bisnis.

ABSTRACT

MUHAMMAD RAIHAN AZZAKY. *Financial Analysis of the Business Potential of Biomass Co-Firing Programs in Coal-Fired Power Plants: A Case Study of a 315 MW Coal-Fired Power Plant in Java.* Supervised by Dr. Ir. Muhammad Ahsin Sidqi, MM., IPU., ASEAN.Eng., QRGF

The biomass co-firing program is an energy transition strategy promoted by the Indonesian government to reduce carbon emissions in Coal-Fired Power Plants (CFPP) and achieve the Net Zero Emission 2060 target. This study aims to analyze the financial feasibility and business potential of implementing co-firing in a 315 MW CFPP by comparing biomass ratio scenarios of 0% (base case), 5%, and 10%. The research method employed is quantitative descriptive approach to calculate the Levelized Cost of Electricity (LCOE), Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period. The results indicate that implementing 10% co-firing starting in the 10th year of operation can reduce the LCOE to 6.16 cents USD/kWh, which is more efficient compared to the base case scenario of 6.32 cents USD/kWh. This reduction is driven by the disparity in biomass thermal energy prices, which are 52% lower than coal. In terms of profitability, the 10% scenario yields the best financial performance with an NPV of USD 102,024,976.50 and an IRR of 12.84%, outperforming pure coal operations which have an IRR of 12.53%, with a Payback Period of 5.8 years. In addition to internal benefits, this program creates a captive market potential for the bio-pellet supply industry with estimated revenues reaching USD 7.1 Million (equivalent to IDR 120 Billion) per year. This study concludes that biomass co-firing at a 10% ratio is financially feasible and strategic for the sustainability of the power generation business.

Keywords : *Biomass, Business Potential, Co-firing, CFPP 315 MW, Financial Analysis, LCOE.*