## *ABSTRACT*

*This research aims to compare the fuel ratio of coal substituted with an alternative fuel, Spent Bleaching Earth (SBE), in reducing greenhouse gas emissions (GHG FE-$CO_2$) and to determine the thermal efficiency of a coal-fired power plant along with its components (boiler, steam turbine, and generator) that have implemented co-firing. This study employs a quantitative method, collecting data through documentation, specifically by gathering secondary operational data from the power plant and fuel test results from the power plant laboratory. The obtained secondary data is processed into tables and graphs using ChemicalLogic SteamTab Companion software to obtain the necessary variables for calculations and then analyzed using a descriptive method to summarize the data for easier understanding. The research results indicate that the optimal fuel mixing ratio occurred in September 2021, with 63.19% coal and 36.81% SBE, resulting in an FE-$CO_2$ of 0.41 tons/MWh. Factors influencing the successful reduction of the CO2 emission factor (FE-$CO_2$) include the amount of SBE mixed with coal and the reaction during the combustion process of coal and SBE, due to the catalytic properties of SBE that make combustion more efficient and its adsorbent properties that can capture certain gases. The average thermal efficiency of the powerplants after implementing co-firing is 27.83%, with the average efficiency of its components being 80% for the boiler, 78.27% for the steam turbine, and 89.83% for the generator. The application of co-firing in this powerplant has been proven to reduce greenhouse gas emissions and demonstrates a fairly good generation efficiency.*



***Keywords:*** *Greenhouse Gas Emissions, Spent Bleaching Earth, Coal, Steam Powerplant*