



The Feasibility Study of Coffee, Acacia Wood and Corn Cob Residues to produce Biomass Pellets Fuel

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Abstract. The objective of this research is to study the technical and economic feasibility of biomass pellet production from coffee, corncob and acacia wood residues for using as alternative energy. The biomass pellet in this research was produced by mixing three residues with the amount of tapioca starch not more than 20% by mass. The fuel properties of pellet were analyzed according to PFI and ASTM standards. The test results showed that the heating value of the pellet from coffee, acacia wood and corncob residues are 23.56, 20.43 and 19.46 MJ/kg, respectively. The moisture, ash, and durability index are 0.15-0.43, 0.954-0.957, and 95.37-98.52 %, respectively which are according to the standard. The bulk density is 221.04-277.93 kg/m³. The economic feasibility of pellet production was analyzed using Net Present Value (NPV), Reduction Rate (RR) and payback period (PB). The analysis results show that the production of biomass pellets from the residues of coffee, acacia wood and corncobs are economically feasible with RR = 27.56, 17.88, 14.61%, NPV = 186,837 ₪, 91,684 ₪, 62,119 ₪, and payback period = 4 years and 7 month, 5 years and 4 month, 6 years and 8 month respectively. Moreover, the sensitivity analysis results show that the most influential risk factors of the pellet production are fuel price and the quantity of fuel produced daily, followed by labor wages, production days a year, and price of machines.

Keywords: coffee, acacia wood, corn cob, biomass pellet.