

***Design of an Off-Grid Solar Power Plant (PLTS) for Tobacco Leaf Shredding
Machine in Biting Pinggir Village, Arjasa District, Jember Regency***
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ABSTRACT

Biting Pinggir Village in Arjasa Sub-district, Jember Regency, is one of the tobacco production centers that faces the problem of power outages, especially during harvest season. This condition disrupts the tobacco leaf sharpening process that uses electric machines, so a reliable and sustainable alternative energy solution is needed. This study aims to plan an Off-Grid Solar Power Plant (PLTS) system as the main energy source for tobacco leaf chopping machines. The research methodology includes field survey, load data collection, solar irradiation, as well as energy demand calculation, component selection (solar panels, batteries, inverters), and economic feasibility analysis using NPV, BCR, and Payback Period methods. The design results show that the total daily energy consumption is 8,452.5 Wh. The energy that can be supplied by the Off-Grid PLTS system is 2,400 Wp consisting of 4 units of 600 Wp solar panels and 3 units of 48V 100Ah batteries. The system is able to operate independently with high efficiency and produce optimal performance based on PVsyst simulation. The economic analysis shows that the project is financially viable and can be implemented as a renewable energy solution to support modern, environmentally friendly agriculture.

Keywords: *economic analysis, Off-Grid Solar PV, renewable energy, stand-alone system, tobacco shredder.*