

***Performance Evaluation of a 200 Wp Off-Grid PV System as a Power Supply
for a Tool Transforming Plastic Bottle Waste into 3D Printing Filament.***

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ABSTRACT

Indonesia is the second largest contributor of plastic waste in the world, with PET plastic that is difficult to decompose and pollute the environment. Access to electricity is still limited, with an electrification rate of 71.2%. This research develops a tool for transforming plastic bottle waste into 3D printing filaments based on 200 Wp off-grid solar power plant without manual shredding. This machine is equipped with a heating element, off-grid PLTS system, backup battery, and Automatic Transfer Switch (ATS). Tests were conducted to evaluate the performance of the tool and the PLTS system as its energy source. The results show that the PLTS system has stable 74 watt until 75 watt performance despite power fluctuations due to variations in solar radiation and inverter efficiency. Three days of testing showed that the inverter was able to maintain the power supply well despite slight fluctuations due to environmental changes. Optimisation is needed to improve the energy conversion efficiency, so that the system can work more optimally in processing waste plastic.

Keywords: 3D Printing Filament, Off-Grid Solar Power Plant, Device performance, Plastic Bottle Waste Transformation, Solar Radiation.