

***Design And Development of an Ecosolar Instore Onion Dryer for Shallot Farmers
in Brumbungan Lor Village, Probolinggo Regency
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ABSTRACT

Ecosolar Instore Onion Dryer is a solar-powered onion drying system designed to provide a more controlled drying process. This study aimed to design, construct, and evaluate the performance of Ecosolar Instore Onion Dryer. The research employed an engineering design approach consisting of design, fabrication, structural testing, and functional testing stages. The system consists of a four-tier drying chamber, a 500 W heater, circulation fans, an exhaust fan, a 1100 Wp photovoltaic system, a 24 V 100 Ah LiFePO₄ battery hybrid inverter, and a microcontroller-based monitoring system. Structural testing results indicated that the frame and drying racks were in good condition and suitable for operation. Functional testing showed that the drying chamber temperature ranged from 44.55°C to 50.20°C, with an average of 46.44°C, while the relative humidity ranged from 33.58% to 46.70%, with an average of 41.20%. Heat distribution was relatively uniform, with temperature differences between racks ranging from 2°C to 5°C. The solar energy system produced a photovoltaic voltage of 76.14-82.58 V and a current of 1.52-6.80 A, with an average maximum photovoltaic power output of 541.58 W and an average maximum inverter power output of 570.90 W. The results demonstrate that Ecosolar Instore Onion Dryer operated stably, met the energy requirements of the drying system, and is feasible for use as a solar-powered onion drying technology.

Keywords: Shallot, Ecosolar Instore Onion Dryer, solar energy, enclosed drying, photovoltaic system.