Experimental evaluation on large scale solar dryer for drying natural fiber in Malaysia

ABSTRACT

Drying process is one of the most common application used in solar thermal. This experiment was tested on performance of a large-scale solar dryer to dry natural fiber. The dryer consists of several main componentssuch as solar thermal collector, heat exchangers and confine polycarbonate chamber. Average solar irradiance, ambient temperature and relative humidity recorded were612.84 W/m2, 32.42 oC and 60.01 %. The drying was completed in 3 days or 14.58 hours, andable to reduce 1004.2 kg weight and 70.7 % moisture content wet basis. Performance of the dryer was evaluated based on evaporative capacity, specific moisture extraction rate and specific energy consumption, and the values are 68.88 kg/hr, 3.55 kg/kWh and0.28 kWh/kg respectively. Cost of operation determined as RM117.13 per cycle and cost of product was RM0.28 for every kilogram dried fiber produced. Based on capital cost, annual return of investment and profit, payback period estimated is about 3.7 years.