



## Review on solar air heating system with and without thermal energy storage system

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### ABSTRACT

In order to produce process heat for drying of agricultural, textile, marine products, heating of buildings and re-generating dehumidify agent, solar energy is one of the promising heat sources for meeting energy demand without putting adverse impact of environment. Hence it plays a key role for sustainable development. Solar energy is intermittent in nature and time dependent energy source. Owing to this nature, PCMs based thermal energy storage system can achieve the more popularity for solar energy based heating systems. The recent researches focused on the phase change materials (PCMs), as latent heat storage is more efficient than sensible heat storage. In this paper an attempt has been made to present holistic view of available solar air heater for different applications and their performance.

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### 1. Introduction

The continuous increasing pressure of energy demand, the degradation of environment through greenhouse gas emissions and the rise in fuel prices are the main driving forces behind the efforts for more effectively utilizing various sources of renewable energy. Renewable technologies are considered as clean energy sources and optimal use of these resources minimizes environmental impacts and produces minimum secondary wastes, and such resources are sustainable based on current and future economic and social societal needs. Energy in various forms has been playing an increasingly important role in worldwide economic progress

and industrialization. The growth of world population coupled with rising material needs has escalated the rate of energy usage. Rapid increase in energy usage characteristic of the past 50–100 years cannot continue indefinitely as finite energy resources of earth are exhaustible [1]. Therefore, there is a need to explore the renewable energy sources to meet out the energy demand in present context [2]. Solar energy is the one most abundant renewable energy source and emits energy at a rate of  $3.8 \times 10^{23}$  kW, of which, approximately  $1.8 \times 10^{14}$  kW is intercepted by the earth [3]. The primary forms of solar energy are heat and light. Sunlight and heat are transformed and absorbed by the environment in a multitude of ways [4].

One of the most potential applications of solar energy is the supply of hot air for the drying of agricultural, textile, marine products, heating of buildings to maintain a comfortable environment especially in the winter season [5] and re-generating dehumidify

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