Solar Assisted Heat Pump System for High Quality Drying Applications: A Critical Review

ABSTRACT

Solar assisted heat pump (SAHP) system integrates a solar thermal energy source with a heat pump. This technique is a very fundamental concept, especially for drying applications. By combining a solar thermal energy source such as solar thermal collectors and a heat pump dryer will assist in reducing the operation cost of drying and producing products with high quality. Many review papers in the literature evaluated the R&D aspects of solar-assisted heat pump dryers (SAHPD). This critical review paper studies some of the researches conducted in this field to understand and provides an update on recent developments in SAHPD. Also, a detailed explanation of principles and operation for SAHPD and its applications are presented. The used types of solar thermal collectors, as well as various heat pump dryers, are all discussed in this article. Finally, it is concluded that there is a clear lack of research in the techno-economic and environmental evaluation, while most of SAHPD studies focused on the performance study of the system.