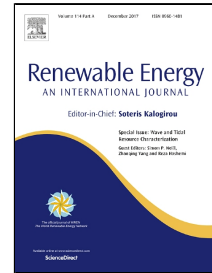


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Thermoeconomic and Environmental Analysis of Solar Flat Plate and Evacuated Tube Collectors in Cold Climatic Conditions

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1 Thermo-economic and Environmental Analysis of Solar Flat Plate and Evacuated Tube Collectors
2 in Cold Climatic Conditions

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15 Abstract:

16

17 In the current study, a thermo-economic analysis of two different solar hot water systems based
18 on two types of flat plate collector (FPC) and evacuated tube collector (ETC) are studied under
19 the cold climate conditions of Iran. The annual solar collector energy output and the collectors'
20 output temperature are calculated using the TRNSYS16 software. As a result, it is found that the
21 inlet temperature and weather conditions are the two major variables which effect on the
22 collector performance. Finally, according to the thermal and economic analysis, the performance
23 of ETC system is 41% better than the FPC systems, and the yearly useful energy gain of ETC is
24 30% more than that of FPC in cold climate. So, applying ETC in cold climate is recommended.
25 Additionally, this simulation will be extendable and applicable for every zone with any climatic
26 condition.

27

28 Keywords: Flat plate collector; evacuated tube collector; thermo-economic analysis; economic
29 assessment

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33 Introduction

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