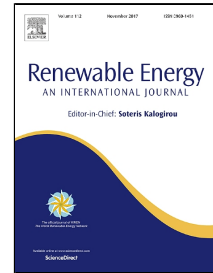


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A novel concentrating photovoltaic/thermal solar system combined with thermoelectric module in an integrated design

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3 **A novel concentrating photovoltaic/thermal**
4 **solar system combined with thermoelectric module in an integrated design**

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10 **Abstract**

11 The use of solar energy concentration systems for achieving performance enhancements in the
12 Photovoltaic/thermal hybrid solar systems and reduction of initial costs is an idea that has been
13 studied for years. In this article a new structure for parabolic trough photovoltaic/thermal collector
14 is proposed and its thermal and electrical performances are experimentally investigated. The
15 receiver of this concentrator contains a triangular channel with an outer surface covered with
16 photovoltaic cells and thermoelectric modules with a specific arrangement so that in addition to
17 absorbing heat, a larger portion of the solar radiation is directly converted to electricity. Hence,
18 the performance of the system is enhanced. Performance evaluation of this combined heat and
19 power system that is equipped with one-axis solar tracker in polar mechanism shows that daily
20 average electrical and thermal efficiencies can reach 4.83% and 46.16%, respectively. In addition,
21 the electricity generation capacity of the photovoltaic module applied to this system has become
22 fourfold in comparison with its standard working conditions. As a result, besides simultaneous
23 generation of heat and electricity, the proposed model has a satisfactory performance.
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29 keywords: **photovoltaic/thermal, thermoelectric module, Parabolic trough collector, Hybrid**
30 **solar system**
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