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Review

Study of thermoelectric and photovoltaic facade system for energy efficient building development: A review

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ABSTRACT

Energy usage in buildings has become a critical issue due to increase in occupants' time spent inside a building and use of energy intensive equipment for providing comfort. Utilization of an alternate source of energy can be considered one of the promising solutions to tackle this issue. In the present paper, a review of photovoltaic (PV) and thermoelectric (TE) technologies implemented for energy efficient building development is presented, discussed and critically analyzed. Then, the basics of the solar panel and its performance parameters are introduced. After that, the integration of the PV technology in the building particularly on the wall and its benefits with respect to the building energy consumption has been thoroughly studied. It was found that about half of building thermal load was reduced by installation of a PV panel over the wall. In addition, the thermoelectric module as a substitute to the air conditioning technology is reviewed and literature that focuses on the integration of both TE and PV for building applications has been studied. It can be seen that the PV integrated with the TE system increases the energy saving potential by 22% and reduces 5–10 °C indoor temperature from the ambient conditions. At the end of this article, few challenges, environmental aspect and future research directions are also addressed in detail.

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