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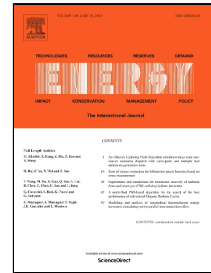
Computational modeling of a BIPV/T ethylene tetrafluoroethylen (ETFE) cushion structure roof

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## 1 **Computational modeling of a BIPV/T ethylene tetrafluoroethylen (ETFE)** 2 **cushion structure roof**

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### 9 **Abstract**

10 Building integrated ETFE foils are used as the absorbing structure in the solar energy  
11 targeted applications. These foils as a building transparent material have been drawing much  
12 more attention for the past decades. In addition, integration of amorphous photovoltaic cells  
13 with these ETFE foils is taken into account due to the low production cost and its resistance  
14 to high operating temperatures. In the present study, a Building integrated Photovoltaic  
15 thermal (BIPV/T) ETFE cushion roof was numerically modeled and the thermal and  
16 electrical performances of this system were obtained in two cases: the cushion with the  
17 steady state mass flow and the cushion with the air pressure regulator system. Verification of  
18 the modeling was performed by comparing the model's results with the available  
19 experimental data in the literature. The main strength of the present modeling is  
20 consideration of the air pressure regulator system in the modeling process which has not  
21 been studied yet. The result of the present study showed that the present model predicts the  
22 BIPV/T ETFE cushion performance with a reasonable accuracy and can predict the system  
23 performance under different operating conditions. The results also showed that in case of the  
24 cushion with the steady state mass flow, the power generation is 15% higher than that of the  
25 cushion with the pressure regulator system. However, the cushion with the steady state mass  
26 flow has a low net output power due to the high consumed power of the blower.

27 **Key words:** ETFE, computational, PV module, modeling, cushion, BIPV

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