Nighttime radiative cooling technology has been studied both by means of simulations and experiments, to evaluate its potential and to validate the existing theoretical models used to describe it. Photovoltaic/thermal panels (PV/T) and unglazed solar collectors have been chosen as case studies. An experimental setup has been constructed and tested during summer of 2014, at the Technical University of Denmark. The cooling performance (heat loss) has been measured simultaneously for both types of panels, installed side-by-side. The experimental results have been compared with the results from a commercial building simulation software and from theoretical calculations. All three methods showed good consistency in the cooling output. The cooling power ranged between 20 to 75 W/m² without a noticeable difference between the PV/Ts and the unglazed collectors, the outcome depending mainly on the sky clearness. The obtained values showed a good agreement with the ones found in the literature about solar panels or other kinds of heat sinks used for radiative cooling applications. The panels provided a cooling performance per night ranging between 0.2 and 0.9 kWh/m² of panel. The COP values (defined as the ratio between the obtained cooling and the energy used by the circulation pump) reached very high values, ranging from 19 to 59, which highlights the potential of this technology for energy savings for cooling purposes. Possible applications include cooling production for non-residential buildings such as offices under the Scandinavian climate, and, in addition, for residential buildings under Southern climates.

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