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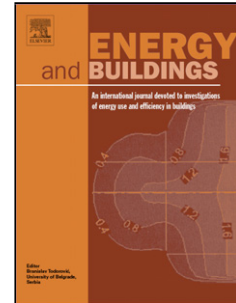
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Investigation on the Cooling Performance of Green Roof with a Radiant Cooling System

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ABSTRACT

This study investigated the cooling potential of a green roof paired with a radiant cooling system in a hot and dry environment in southern California. The green roof had pipes embedded in it which were connected to a radiator inside the test cell. The radiator absorbs heat from the interior of the cells which is dissipated through the green roof and the evaporative cooling that occurs during the irrigation process. Excess water that is not absorbed is recollected and reused. Experiments demonstrate the potential for a system such as this one that combines water based cooling and green roofs, demonstrating to improve thermal comfort and reduce energy consumption. The test cell with the green roof and radiant cooling system was monitored and compared with other cells in over 40 tests conducted over the summers of 2015 and 2016. The results demonstrated that this test cell maintained lower indoor temperatures than the other test cells, including other cells with green roofs. The best performance occurred when the radiant system pump was operating continuously, with the irrigation sprinkler working 20 minutes per hour from 11:30 a.m. to 4:30 p.m. An equation to predict indoor maximum temperature as a function of the daily temperature swing was derived.

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