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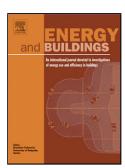
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ACCEPTED MANUSCRIPT

1	Thermal Performance Investigation and Optimization of Buildings with
2	Integrated Phase Change Materials and Solar Photovoltaic Thermal
3	Collectors
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11	Abstract: This paper presents the thermal performance investigation and optimization of
12	buildings with integrated phase change materials (PCMs) and solar photovoltaic thermal
13	(PVT) collectors. PCMs are embedded into building envelopes to increase local thermal mass
14	while PVT collectors are used to generate both electricity and low grade thermal energy for
15	winter space heating. The thermal performance of a typical Australian house with PVT
16	collectors and three different types of PCMs is simulated and analyzed by comparing with
17	that of the house using PVT collectors only, using PCMs only, and without using PVT
18	collectors and PCMs. The results showed that using PVT collectors and PCMs
19	simultaneously can substantially improve the indoor thermal performance of the house. The
20	Coefficients of Thermal Performance Enhancement (CTPE) of the house using PVT
21	collectors and PCMs of RT18HC, SP21E and SP24E with a thickness of 20 mm were
22	improved to 43.4, 48.8 and 46.2% respectively, compared to that of the house using the
23	PCMs only (-9.1, 2.6 and 0.2% for RT18HC, SP21E and SP24E, respectively). The CTPE of
24	the house can be increased to 70.2% if Taguchi method is used to determine the optimal air
25	flow rate of PVT collectors, thickness of PCM layers, PCM type and additional wall

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