

REVIEWER'S REPORT

Manuscript No.: IJAR- 58238

Title: Phase Change Materials (PCM) in the Building Envelope: State of the Art

Recommendation:		Rating	Excel.	Good	Fair	Poor
Accept	Originality		Yes			
	Techn. Quality			Yes		
	Clarity		Yes			
	Significance		Yes			

Reviewer Name: Dr. Ashish Yadav

Detailed Reviewer's Report

Reviewer's Comment for Publication.

Acceptance Comments are mentioned below suitable for the paper titled "Phase Change Materials (PCM) in the Building Envelope: State of the Art"

Reviewer Comments: Accept

Reviewer Comments –

Introduction

The introduction clearly establishes the significance of energy consumption in buildings and justifies the need for passive thermal energy storage technologies such as PCMs. The background information is comprehensive and effectively highlights the relevance of PCM integration in hot and humid climates. The research objectives are well defined and provide a strong foundation for the subsequent sections of the review.

Literature Review

The literature review is extensive and systematically organized, covering the physicochemical principles, classification, selection criteria, and various integration methods of PCMs. The authors have successfully synthesized findings from a broad range of published studies, enabling readers to understand the current state of research. The review also identifies existing limitations and knowledge gaps, thereby enhancing its academic value.

Solution Approach

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The manuscript adopts a logical and comprehensive review methodology by categorizing PCM technologies based on chemical composition, microstructure, thermal properties, and application methods. The comparative analysis of integration techniques in walls, roofs, floors, and glazing provides practical insights into their performance. The inclusion of environmental and economic assessments further strengthens the applicability of the proposed review framework.

Results and Discussion

The results and discussion are well presented, demonstrating the positive impact of PCM incorporation on reducing indoor temperature fluctuations, enhancing thermal inertia, and improving energy efficiency. The discussion also critically evaluates the trade-offs between thermal performance and mechanical properties, providing a balanced interpretation of experimental findings. The environmental and life-cycle considerations significantly improve the practical relevance of the study.

Conclusion

The conclusion effectively summarizes the major findings and highlights the importance of selecting appropriate PCM types based on climatic conditions and building applications. The authors provide meaningful recommendations for future research, particularly regarding bio-based PCMs and region-specific adaptations for West Africa. Overall, the conclusions are consistent with the reviewed literature and successfully demonstrate the contribution of the study to sustainable building design.