

Heat storage in lightweight structural concrete with a low carbon footprint



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Khaled Alassaad

Climate change is driving the construction industry toward more sustainable practices. To tackle the environmental impact, we are exploring new building solutions. Cement-based materials are major culprits in CO₂ emissions while heating homes requires significant energy consumption. We're actively searching for alternatives, focusing on low-carbon binders and improved insulation. My research investigates a novel approach: developing a low-carbon binder incorporating stabilized phase change materials into expanded clay. This combination offers excellent insulation and the ability to store thermal energy, aligning with environmental requirements. We plan to conduct practical experiments and numerical simulations to assess this composite's mechanical and thermal properties.

Supervisors:

Prof Pieter De Wilde
Dr James Minto

Cement is made from clinker




= 88% of CO₂ emissions of Cem'In'Eu cement

CEM I: Portland cement (95% clinker)
CEM II: Compound Portland Cement (65~94% clinker)
CEM III: Blast Furnace Cement (5~64% clinker)


EN 197-1

Energy consumption

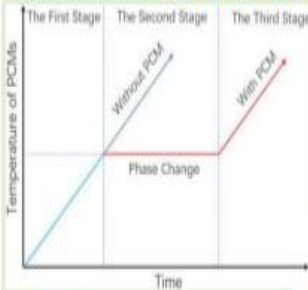


32.5% in UK in 2019

- Addition of expanded clay
- Lightweight concrete
- Insulation enhancement



Latent heat storage



PCM: Phase change material

Yan et al. 2021

