

The management of energy consumption in the building sector is of crucial concern for modern societies. Fossil fuels" reduced availability, along with the environmental implications they cause, emphasize the necessity for the development of new technologies using renewable energy resources. Taking into account the growing resource shortages, as well as ...

A review on thermal energy storage using phase change materials in passive building applications. J. Build. Eng., 32 (2020), Article 101563. ... thermal properties and solar thermoregulation performance of shape-stable attapulgite based composite phase change material in foam concrete. Sol. Energy, 236 (2022), pp. 51-62.

Research on phase change material (PCM) for thermal energy storage is playing a significant role in energy management industry. However, some hurdles during the storage of energy have been perceived such as less thermal conductivity, leakage of PCM during phase transition, flammability, and insufficient mechanical properties. For overcoming such obstacle, ...

The aim of this study was to assess the characteristics of fly ash foam concrete containing two varying temperature ranges of microencapsulated phase change materials (PCMs): PCM28D (26-30 °C) and PCM43D (41-45 °C). In total, five different fly ash foam concrete samples were prepared, and the unit weight of cement was substituted with varying ...

Thermal Energy Storage (TES) using Phase Change Material (PCM) has evolved as one of the prominent and sustainable technology for improving thermal performance of varieties of thermal systems. ... The location of PCM along with PU foam and air cavity in concrete block was evaluated experimentally to understand their effect on indoor thermal ...

To date, studies on the thermophysical properties of energy storage concrete (ESC) have focused on the effects of changes in the MPCM concentration on the thermal conductivity, specific heat capacity, latent heat of phase change, thermal diffusivity, and energy savings [15, 16]. Cao et al. incorporated three MPCMs with different shell ...

1. Introduction. With the development of society, energy consumption is increasing day by day [1] some developed countries, 40% of energy consumption is related to building energy consumption of which 60% are related to room thermal regulation systems such as heating, exhaust and refrigeration [2, 3]. The application of phase change materials (PCMs) ...

Qu [89] simulated energy consumption of buildings built with phase change thermal storage foam concrete by EnergyPlus. The results showed that the buildings with phase change thermal storage foam concrete had a

3.12 % energy saving rate and higher comfort than common buildings, and could effectively reduce the indoor temperature fluctuation.

Improving Thermal Energy Storage (TES) of buildings using Phase Change Material (PCM) is widely used to develop energy efficient building envelope. In this study, ...

Phase change materials possess the merits of high latent heat and a small range of phase change temperature variation. Therefore, there are great prospects for applying in heat energy storage and thermal management. However, the commonly used solid-liquid phase change materials are prone to leakage as the phase change process occurs.

On-site renewable energy generation systems are installed for buildings to compensate for their energy consumptions due to cooling and heating loads. Fluctuated energy load can significantly affect the decision on the selection of renewable energy systems. This study developed a new phase change foam concrete with low thermal conductivity and suitable ...

1 Introduction. Building energy consumption is maximising year after year due to population, urbanisation, and people's lifestyle. The increased greenhouse gas (GHG) emissions and climate change risks have drawn attention to adopting alternative energy sources [1, 2]. Buildings are globally known as the biggest consumer of energy and the main ...

Phase change material (PCM) for thermal energy storage (TES) is the material that can absorb energy during heating process as phase change takes place and release energy to environment during cooling process. Nowadays, energy consumption trends in construction building show a significant increase.

The aim of this study was to assess the characteristics of fly ash foam concrete containing two varying temperature ranges of microencapsulated phase change materials (PCMs): PCM28D (26-30 °C) and PCM42D (42-48 °C) ...

In order to seek building materials with energy-saving effect, a phase change thermal storage foam concrete with thermal storage and temperature regulation capabilities ...

The integration of phase change materials (PCMs), explored by researchers like Khudhair & Farid [10] and Soares et al. [11], augments concrete's thermal energy storage ...

Phase change materials (PCMs) with high energy storage capacity and small temperature change during phase change process have been widely applied in electronic thermal management, waste heat recovery systems, off-peak power storage systems, and building materials [1], [2], [3], [4]. According to their compositions, PCMs can be categorized into ...

Downloadable (with restrictions)! On-site renewable energy generation systems are installed for buildings to

compensate for their energy consumptions due to cooling and heating loads. Fluctuated energy load can significantly affect the decision on the selection of renewable energy systems. This study developed a new phase change foam concrete with low thermal ...

Study on properties of phase change foam concrete block mixed with paraffin/fumed silica composite phase change material. Renew Energy ... Thermophysical and mechanical properties of hardened cement paste with microencapsulated phase change materials for energy storage. Materials, 7 (2014), pp. 8070-8087, 10.3390/ma7128070. View in Scopus ...

Paraf fi n (44)/ Concrete Direct mixing Foam concrete o The thermal storage capacity of. composite PPCM/concrete is. ... energy storage using phase change materials, Mater. Today.

M. Amar, M. Mohamed, A review on energy conservation in building applications with thermal storage by latent heat using phase change materials, Energy Convers. Manag. 45, 263-275 (2004) [Google Scholar]

Semantic Scholar extracted view of "Investigation on properties of phase change foamed concrete mixed with lauric acid-hexadecanol/fumed silica shape-stabilized composite phase change material" by Pengfei Wei et al. ... Preparation and thermal properties of phase change energy storage composite material based on modified fly ash. Pu Chen Dahua ...

Unlike conventional materials in buildings that store thermal energy perceptibly, PCMs store thermal energy in a latent form by undergoing phase change at a constant temperature, leading to larger energy storage capacity and more effective thermal control [14], [15] pared to sensible heat thermal energy storage materials, PCM can store 5-14 times ...

The use of phase-change materials (PCM) in concrete has revealed promising results in terms of clean energy storage. However, the negative impact of the interaction between PCM and concrete on the mechanical and durability properties limits field applications, leading to a shift of the research to incorporate PCM into concrete using different techniques to ...

Thermal storage is very relevant for technologies that make thermal use of solar energy, as well as energy savings in buildings. Phase change materials (PCMs) are positioned as an attractive alternative to storing thermal energy. This review provides an extensive and comprehensive overview of recent investigations on integrating PCMs in the following low ...

change materials, the PCM phase change temperature radius and phase change concrete thickness. 2. Establishment of model . The building envelopes system is presented in Figure1 ith porous foamed concrete saturated with w PCMs.The foamed concrete is assumed as phase change concrete, which is in the center of building

Phase change energy storage foam concrete

Phase change energy storage plays an important role in the green, efficient, and sustainable use of energy. ... [5 5] mixed an EG/paraffin composite material with foam concrete to . prepare a ...

The phase change energy storage concrete prepared by adding phase change energy storage particles to concrete has excellent mechanical properties and thermal properties of concrete. Choosing appropriate phase change materials and mix proportion can effectively reduce the energy consumption of concrete buildings on the premise of meeting the ...

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