

What is concrete-based energy storage?

The exploration of concrete-based energy storage devices represents a demanding field of research that aligns with the emerging concept of creating multifunctional and intelligent building solutions. The increasing need to attain zero carbon emissions and harness renewable energy sources underscores the importance 2024 Reviews in RSC Advances

How can we improve the thermal energy storage capacity of concrete?

3. Integration of Phase Change Materials (PCMs): Investigating the integration of PCMs into concrete can enhance its thermal energy storage capabilities. Research can focus on developing new PCM-concrete composites or exploring the use of microencapsulated PCMs to enhance the latent heat storage capacity of concrete.

Is concrete a reliable medium for thermal energy storage?

Concrete's robust thermal stability, as highlighted by Khaliq & Waheed and Malik et al. , positions it as a reliable long-term medium for Thermal Energy Storage (TES). This stability ensures the integrity of concrete-based TES systems over extended periods, contributing to overall efficiency and reliability.

What is the experimental evaluation of concrete-based thermal energy storage systems?

The experimental evaluation of concrete-based thermal energy storage (TES) systems is a critical process that involves conducting tests and measurements to assess their performance and validate their thermal behaviour.

What is thermal energy storage in concrete?

The advancements in thermal energy storage (TES) in concrete have opened up new possibilities for efficient energy management in the built environment. The applications of TES in concrete are wide-ranging and offer significant benefits, including load shifting, demand response and integration of renewable energy sources.

Can thermal energy storage in concrete be economically feasible?

When conducting an economic feasibility and cost analysis of thermal energy storage (TES) in concrete, various aspects need to be considered. One of the primary factors is the assessment of initial investment costs.

By storing excess thermal energy during periods of low demand or high energy production, concrete matrix heat storage systems contribute to energy efficiency and load balancing in the energy grid. This allows for the efficient utilisation of renewable energy sources, as the stored energy can be released when demand exceeds production. In ...

For this, using steel balls as the carrier material and butyl stearate as the phase change material (PCM), the authors combined the phase change energy storage material with the energy pile to prepare a new type of concrete energy pile enhanced with the PCMs. Then, the tests and numerical simulations were conducted to

study the optimal mix ...

This indicates a promising direction for future research on enhancing thermal energy storage through concrete surface optimization and substantiates the potential of concrete as an inexpensive, scalable, high performance TES material. Previous article in issue; Next article in issue; Keywords . Concrete surface roughness. Computational fluid dynamics. Thermal ...

The main task is to find the solution for energy storage from renewable sources to cover time periods with absence of generation and to supply consumers with electrical energy continuously. The storing system, based on gravity and kinetic energy, allows renewables to ...

Test results showed that the maximum percentage of octadecane carried by HSBs was 80.3% by mass. The macro-encapsulated PCM-HSB has a latent heat storage capacity as high as 200.5 J/g. The...

In this study, an innovative method of macro-encapsulation of PCM using hollow steel balls (HSB) was developed and the thermal and mechanical performance of PCM-HSB ...

We comprehensively review concrete-based energy storage devices, focusing on their unique properties, such as durability, widespread availability, low environmental impact, and advantages.

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Test results of concrete thermal energy storage for parabolic trough power plants: Laing et al. [32] 2009: Journal of Solar Energy Engineering, Transactions of the ASME: 83 #1#3: 4: Comparative life cycle assessment of thermal energy storage systems for solar power plants: Oró et al. [33] 2012: Renewable Energy: 80 #1: 5: Performance analysis of a two-stage ...

The idea of using concrete for energy storage has been there for quite sometime at the conceptual level. In 2021, a team at Chalmers University of Technology in Gothenburg demonstrated the concept using ...

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Electron-conducting concrete combines scalability and durability with energy storage and delivery capabilities, becoming a potential enabler of the renewable energy ...

We comprehensively review concrete-based energy storage devices, focusing on their unique properties, such as durability, widespread availability, low environmental impact, and advantages. First, we elucidate how concrete and its composites revolutionize basic building blocks for the design and fabrication of intrinsically strong structural ...

Concrete ball energy storage Kyiv

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Cui et al. [16] contributed by developing macro-encapsulated thermal energy storage concrete, emphasizing both the mechanical properties of the material and the importance of numerical simulations. The study integrates experimental findings with numerical models, providing a holistic perspective on the material's behaviour in practical applications. Martelletto ...

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