

Can thermal energy storage be integrated into low-temperature heating & high- temperature cooling systems? The present review article examines the control strategies and approaches, and optimization methods used to integrate thermal energy storage into low-temperature heating and high-temperature cooling systems. The following are conclusions and suggestions for future research and implementation in this field:

Are cold thermal energy storage systems suitable for sub-zero temperatures?

Overall, the current review paper summarizes the up-to-date research and industrial efforts in the development of cold thermal energy storage technology and compiles in a single document various available materials, numerical and experimental works, and existing applications of cold thermal energy storage systems designed for sub-zero temperatures.

What is a thermal energy storage system?

The design of these types of thermal energy storage (TES) systems is mostly similar to the ones used for higher temperature ranges. However, some specific requirements need to be taken into account at sub-zero temperatures, like volume change control and mechanical properties of the containment.

Can materials and technologies store cold energy at low temperatures?

Hence,even if many references of materials and methods for storing cold energy can be found at low temperatures,we detected the need for a comprehensive updated paper that synthesizes the information available on materials,technologies,and applications progress in the field for sub-zero,especially extremely low temperatures.

What are sensible and latent thermal energy storage?

Sensible, latent, and thermochemical energy storages for different temperatures ranges are investigated with a current special focus on sensible and latent thermal energy storages. Thermochemical heat storage is a technology under development with potentially high-energy densities.

How to choose a suitable thermal energy storage material?

The selection of a suitable thermal energy storage material is the foremost step in CTES design. The materials that can be used for cold storage applications are mainly sensible thermal energy storage materials and PCMs.

Design optimization of low-temperature latent thermal energy storage for urban cooling applications. Author links open overlay panel Alex Soh, Zhifeng Huang, ... This study ...

At Fraunhofer ISE, storage systems are developed from material to component to system level. Sensible, latent, and thermochemical energy storages for different temperatures ranges are investigated with a ...

5 ???· A single-tank molten salt thermal energy storage (TES) with a supercritical CO₂ (S-CO₂) cycle

is a key technology for concentrated solar power (CSP) plants to a. ... Results ...

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 ...

Recent research focuses on optimal design of thermal energy storage (TES) systems for various plants and processes, using advanced optimization techniques. There is a wide range of TES technologies for ...

The studies on low-temperature aqueous rechargeable energy storage (ARES) are systematically and comprehensively summarized. Electrolyte optimization and electrode modification are the main design st...

The phase equilibrium studies for low-temperature energy storage applications in our group started with the work developed for the di-n-alkyl-adipates [].A new eutectic system ...

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