

Can solar thermal energy storage replace air-source heat pump?

This study evaluates the techno-economics of replacing an air-source heat pump (ASHP) system with a solar seasonal thermal energy storage (STES) system for space heating in Hangzhou, China. Three heating systems, solar STES, ASHP, and ASHP with short-term storage of solar energy, are developed using TRNSYS for a house with 240 m² of floor area.

Can solar energy improve air source heat pump performance?

A solar-assisted air source heat pump system with thermal storage is proposed. An optimized control method is developed for refrigerant redistribution problem. Heat pump's coefficient of performance is improved by solar energy. The system shows better performance in the region with affluent solar energy.

Does a solar-assisted heat pump have phase change energy storage?

This paper introduces a novel solar-assisted heat pump system with phase change energy storage and describes the methodology used to analyze the performance of the proposed system. A mathematical model was established for the key parts of the system including solar evaporator, condenser, phase change energy storage tank, and compressor.

How TEs can save energy for space heating & air-source heat pump?

So the combined solar heating and air-source heat pump system with TES can save 31% electricity usage for space heating compared to traditional heating system, due to free solar energy utilization and load shifting effect of water tank, which increases heat pump COP indirectly. 4.

What is solar assisted air source heat pump?

Evolutions require new-generation energy efficiency and green refrigerants. Solar assisted air source heat pump shows great potential as a promising energy-saving heating technology, which integrates solar collector and air source heat pump. It is widely considered for supplying hot water, space heating and/or space cooling in the domestic sector.

Does solar heating work with auxiliary heat source and thermal energy storage?

However, due to its instability, solar heating system often works with auxiliary heat source and thermal energy storage (TES) equipment, in order to maintain steady hot water supply for space heating. In this paper, the analytical model is established for a hybrid heating system, containing solar collector, air-source heat pump and water tank.

This paper focuses on constructing a simulation platform for a solar-assisted air source heat pump heating system. A rural residential building in Yongshou County, Shaanxi ...

Jin et al. (2021b) proposed a solar-air source heat pump and later a heat thermal energy storage system and

discussed the effects of different operation modes and parameters ...

A simulation study of the solar-source heat pump (SSHP) system that consists of solar collector group, heat exchanger (water-to-water), energy storage tank, heat pump with ...

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1 ?· This was achieved by an improved utilisation of solar energy for space heating, heat storage, and soil thermal charging. 3. ... Pardo et al. [124] found that using a TES system and ...

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The predominant effect of supply water temperature for heat pump performance is also the outcome of the system design analysis presented in the study by Zhao et al. The proposed ...

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In the design, the energy storage in the transition season and the stable operation of the system are fully utilized to ensure the building air conditioning and heating. ...

To improve solar energy utilization and the stability of solar heating systems, an energy storage air-type solar collector was designed and developed. Phase change material ...

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This paper investigated the performance of a solar-assisted air source heat pump system with energy storage (SASHPS-ES) in Beijing, China, and proposed an optimal operation mode ...

