Greenhouse solar phase change energy storage

How does a solar greenhouse work?

When the indoor air temperature of the solar greenhouse drops at nighttime,the proposed wall and the ordinary wall conduct stored energy back to the inner surface,which then transfers heat from the inner surface of the wall to the indoor environment through heat convection and heat radiation.

How does solar radiation affect heat storage in a greenhouse?

During the daytime,the heat preservation quilt is removed; thus,solar radiation energy can enter the greenhouse through polyethylene vinyl acetate film and irradiate the inner surface of north wall directly,causing a significant increase in north wall temperature,which can significantly increase the heat storage of north wall.

How does a solar greenhouse wall affect indoor air temperature?

The heat storage and release capacityof the wall directly affects the indoor air temperature of the greenhouse. Previous research on the heat storage of solar greenhouse walls has shown that encapsulating and pasting PCMs onto the walls of the greenhouse effectively transfers the solar energy absorbed during the day to the interior of the wall.

How does a greenhouse wall reduce heat release capacity?

Then, the temperature difference between the middle layer of the wall and the inner surface of the wall reduces, leading to less heat into the greenhouse, which reduces the heat release capacity of the wall. However, the proposed wall of the CSG is added with an active heat storage system incorporating PCMs.

The use of the phase-change accumulator in greenhouses makes it possible to save 60.77 kWh of energy per 1 m 2 of usable area, which is 17.23% more economical than the variant using a conventional ...

In response to the problems of passive heat storage, many scholars have introduced active heat storage technology into solar greenhouses to further improve solar energy utilization, enhance wall heat ...

This review inspects scientific investigations that explore how solar greenhouses utilise phase change materials (PCMs) to improve thermal regulation, decrease expenses, and support crop growth.

The utilised keywords are phase change materials, solar greenhouse, greenhouse temperature, agricultural energy efficiency, and "sustainable agriculture. Referring to the inclusion criteria, the peer ...

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The use of renewable energy for food and vegetable production is a potential sustainable method to reduce fossil energy consumption. Chinese solar greenhouses (CSGs) are horticultural facility buildings in ...

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The phase-change back wall of the greenhouse proves more favorable for accumulating solar radiation energy, exhibiting excellent thermal insulation and heat storage properties.

A Phase-Change Energy Storage (PCES) system was used to heat a greenhouse of 180 m2. For the seasonal heat storage unit, paraffin was used as the phase change material (PCM). The system ...

The Thermal Properties of an Active-Passive Heat Storage Wall System Incorporating Phase Change Materials in a Chinese Solar Greenhouse

The strategic integration of solar energy and thermal energy storage (TES) can help to boost energy performance and reduce the carbon emission in the sector. In this paper, the benefits of adding ...

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