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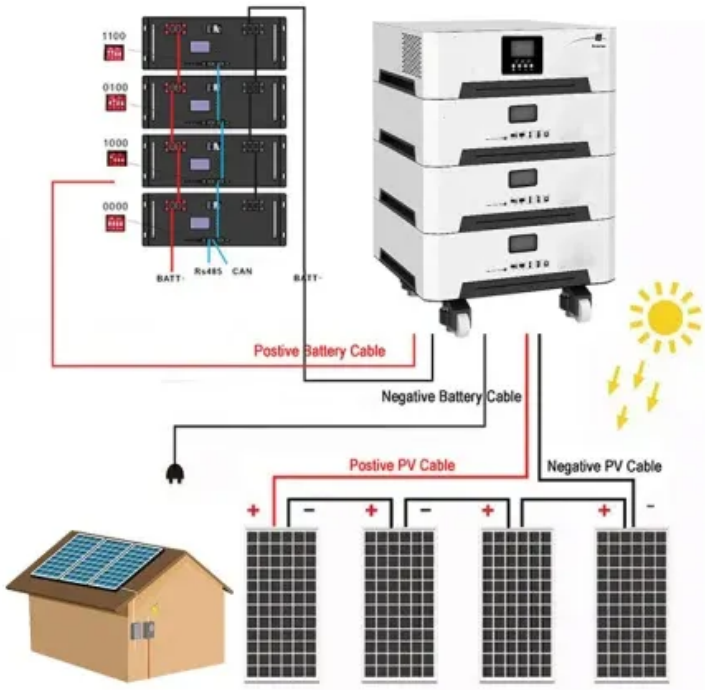
Solar concentrating butterfly power generation system



Overview

This study optimized grid intermittency and instability resulting from photovoltaic (PV) by adding concentrating solar power (CSP) equipped with thermal energy storage (TES), which can be used to form hybrid.

Can concentrating photovoltaic/concentrating solar power be combined with thermal energy storage?

This paper proposed a switchable hybrid system that combines concentrating photovoltaic/concentrating solar power (CPV/CSP) technology with thermal energy storage (TES) to achieve flexible electricity and thermal generation by adjusting the incident solar flux of photovoltaic (PV).

How does a hybrid solar system work?

The hybrid system can directly transfer surplus solar energy into high-quality heat for storage using a rotatable PV/heat receiver. The simulated results demonstrated that the hybrid system effectively improves power generation, optimally utilizes TES capacity, and reduces the levelized cost of electricity (LCOE).

What are the advantages of a hybrid solar system?

The hybrid system utilizing the 1J GaAs with the base configuration of solar multiple (SM) of 1.26 and TES capacity of 5 h improved the annual power production and renewable penetration (RP) by 20.8% and 24.8% compared with the conventional CSP plant, respectively.

What is the LCOE of a hybrid solar plant?

The hybrid plant with monosilicon and a configuration of SM (1.8), PV ratio (1), and TES capacity (6 h) achieved an optimal LCOE of 11.52 $ct/kWh and RP of 75.5%, which is 8.8% lower and 12.1% higher than the CSP plant, respectively. Green M A, Dunlop E D, Hohl-Ebinger J, et al. Solar cell efficiency tables (Version 55).

How long does a single-junction solar system last without grid supplement?

Over a selected seven-day period, the single-junction (1J) GaAs solar cells used in the hybrid system sustainably satisfied the load demand for more than five days without grid supplement, outperforming the CSP plant by an additional two days.

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