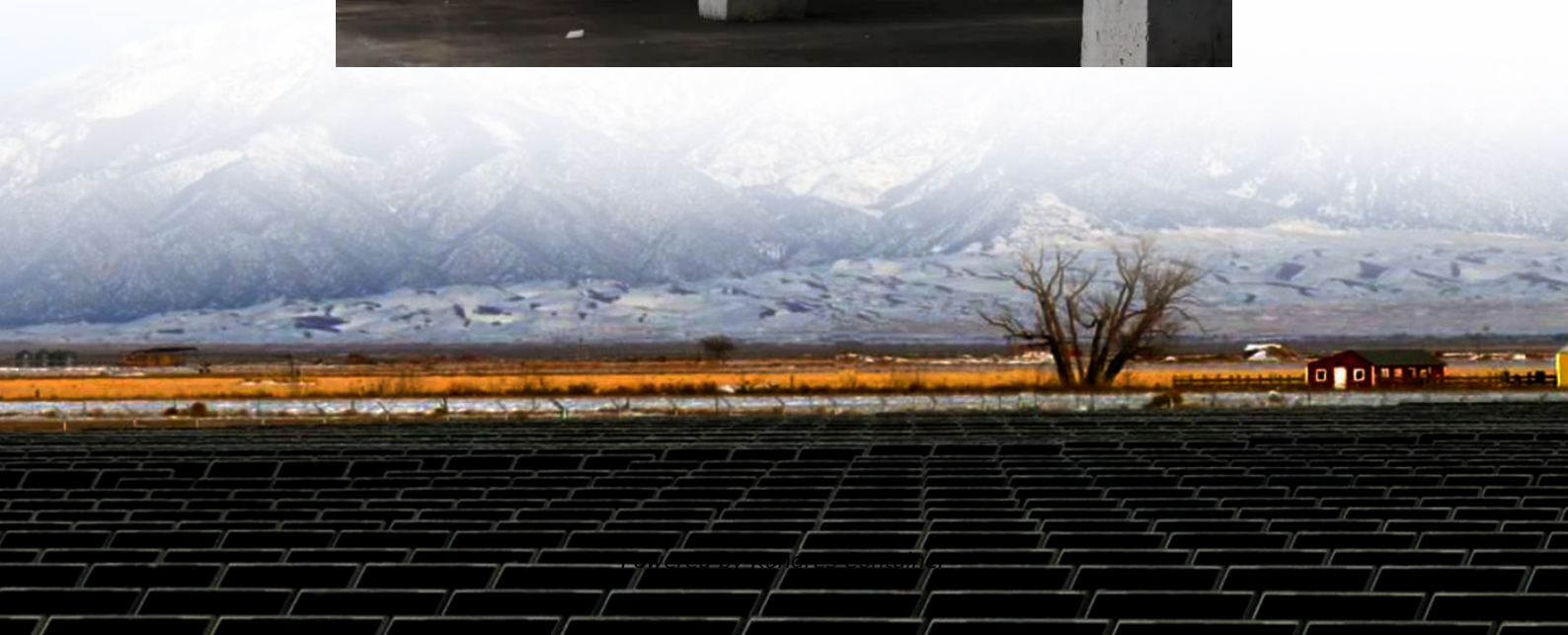


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Do solar energy storage charging piles have potential



Overview

These systems integrate solar generation, battery storage, and fast-charging capabilities—reducing grid dependency while enabling 24/7 clean energy access. Can energy piles store solar thermal energy underground?

Ma and Wang proposed using energy piles to store solar thermal energy underground in summer, which can be retrieved later to meet the heat demands in winter, as schematically illustrated in Fig. 1. A mathematical model of the coupled energy pile-solar collector system was developed, and a parametric study was carried out.

How much energy is stored per unit pile?

Quantitatively, the daily average rate of energy storage per unit pile length reaches about 200 W/m for the case in saturated soil with turbulent flowrate and high-level radiation. This is almost 4 times that in the dry soil. Under low-level radiation, it is about 60 W/m.

How does a solar energy pile-soil system work?

The heat-carrying fluid particle transports heat from the solar collector to the energy pile-soil system continuously. The rate of charging and discharging depends on the flowrate, the intensity of radiation, and the condition of the energy pile-soil system.

What is the maximum temperature of a solar energy pile?

It indicates that both the inlet and outlet temperature of the energy pile undergo a rapid increase during the first hour. Then they increase quite slowly as the underground storage of solar thermal energy continues. The maximum inlet temperature is about 60 °C.

What are energy piles?

One is the primary geotechnical function, and the other is a heat exchanger. Compared to other energy geo-structures, energy piles have been most-

widely investigated and adopted in practical engineering to replace the traditional boreholes of the GSHP systems , , .

How does solar radiation affect energy storage?

The results showed that under abundant solar radiation, the daily average rate of energy storage per unit pile length increases by about 150 W/m when the soil condition changes from being dry to saturated, with a maximum value of about 200 W/m. As the intensity of solar radiation drops, it becomes the dominant factor.

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