

# Experimental report on solar thermal energy storage power generation system

How to calculate solar thermal storage power generation efficiency?

The total efficiency is of the whole solar thermal storage power generation system is 19.6%, which is calculated by  $\eta = \frac{P_{\text{average}}}{P_{\text{total}}}$  where the lunar circadian cycle  $T_{\text{lunar}}$  is 350h, generation efficiency  $\eta$  is 0.95. Fig. 11. Energy flow and heat loss of the whole system.

What is a solar thermal storage system based on lunar ISRU?

The lunar regolith solar thermal storage power generation system based on lunar ISRU is a promising solution of energy supply challenge for long term lunar exploration. The average output power of the designed system can reach 6.5 kW, and the total photoelectric conversion efficiency of the system is 19.6%.

What is a solar energy storage power generation system?

A solar energy storage power generation system based on in-situ resource utilization (ISRU) is established and analyzed. An efficient linear Fresnel collector is configured for solar concentration. The thermal energy reservoir (TER) coupling with Stirling power generator is designed using the fuel tanks of descent module and lunar regolith.

What are the latest advances in thermal energy storage systems?

This review highlights the latest advancements in thermal energy storage systems for renewable energy, examining key technological breakthroughs in phase change materials (PCMs), sensible thermal storage, and hybrid storage systems. Practical applications in managing solar and wind energy in residential and industrial settings are analyzed.

Is a solar energy storage power generation system based on Isru?

A solar energy storage power generation system based on ISRU is established and analyzed. The linear Fresnel collector and lunar regolith thermal energy reservoir (TER) coupling with Stirling power generator are designed. The conversion performance analysis of the solar Stirling power generation system is carried out.

How does a lunar regolith thermal storage power generation system work?

A lunar regolith thermal storage power generation system is modeled and analyzed. The designed system has a specific power of 6.5 W/kg during the lunar nighttime. The heat loss of Fresnel collector takes 37.1% of the total collected solar energy. The total conversion efficiency of designed power generation system reaches 19.6%.

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The development and application of energy storage technology will effectively solve the problems of environmental pollution caused by the fossil energy and unreasonable current energy ...

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