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Energy Analysis of High-Voltage Photovoltaic-Battery System by Different Voltage Charging Method

Objective

This research seeks to measure the charging and discharging characteristics of lead-acid batteries from solar cells to power air conditioners, using real-time monitoring, while also studying how battery capacity, voltage, solar light intensity, and ambient temperature affect battery efficiency and energy use in a high-voltage solar system.

Result

The experiment revealed that solar panel energy transfer to batteries increases with sunlight brightness and light intensity. The number of batteries significantly impacts energy transfer efficiency and storage capacity, with a direct relationship between the number of batteries and voltage difference, affecting current flow and battery health. Using 18 flooded lead-acid batteries optimized energy efficiency and storage for air conditioning use, balancing energy intake from solar panels during the day and usage demands, particularly during peak hours. The study also highlighted the importance of matching battery configuration to usage patterns to avoid overcharging and extend battery life, suggesting automatic circuit breakers for longer periods of inactivity.