

SolarInvert Energy Solutions

Small-scale solar energy storage solutions



Overview

Why is energy storage important?

In the global energy transition, energy storage is key to integrating generation, grid, load, and storage systems. It enhances grid stability, addresses renewable energy intermittency, and supports a resilient, efficient, and sustainable energy infrastructure, enabling the seamless adoption of clean energy.

What is a small-scale CSP system?

The small-scale CSP system with TES in this work offers a reliable and near-continuous green electricity supply for remote, off-grid applications where the use of backup fossil-fuel generators needs to be minimised. These systems are competitive with PV-battery systems for locations with high DNI resource.

What happens if solar storage is undersized?

An undersized storage would lead to curtailment of solar energy provided by the collector-receiver due to the storage being full, and consequently a less-than-optimal amount of electricity being generated throughout the year.

What is the minimum LCOE for a 31.5 kW solar system?

For a system with 31.5 kW e scale, the minimum LCOE of 217.8 USD/MWh e with 87.24% CF occurs at 2.55 solar multiple and 16.08 storage hours. The optimum design parameters are a result of balancing capital costs with annual electricity generation for minimum LCOE.

How can plant solar multiple and storage hours be optimised?

Plant solar multiple and storage hours are optimised using a multi-objective genetic algorithm to minimise the levelised cost of electricity (LCOE) and maximise the capacity factor (CF). The optimal LCOE is found to be ranging from 122.7 USD/MWh e to 217.8 USD/MWh e when using optimistic and pessimistic power block cost assumptions.

Does oversized solar storage increase LCOE?

An oversized storage would lead to a high capital cost contribution by the storage component, without any increase in annual electricity generation, and hence a higher LCOE. The parametric sweep indicates a minimal LCOE in the region of solar multiple of 2.3–2.9 with approximately 14–20 h of storage.

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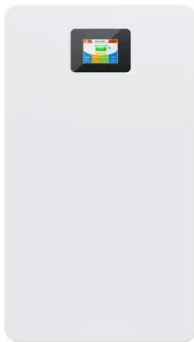
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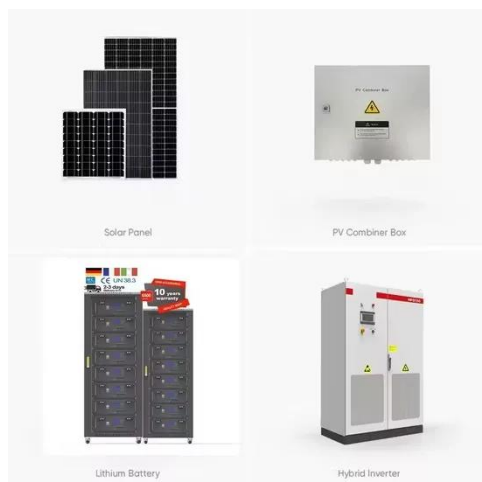
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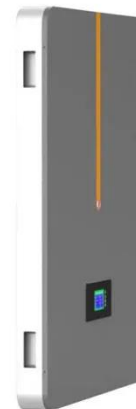
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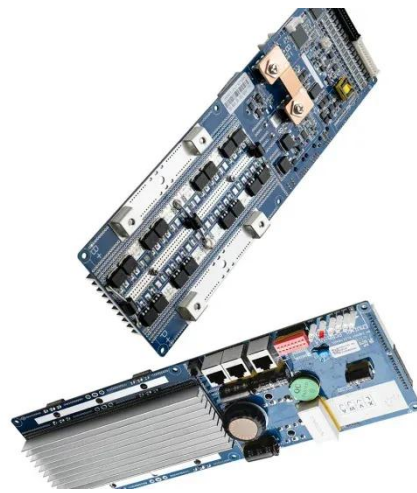
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