

Solar energy storage single capacity





Overview

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.

How much LCOE does a solar plant need?

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. In order to obtain precise optimal plant design parameters and show the trade-off between LCOE and CF, a multi-objective optimisation routine is implemented. Fig. 7.

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 maximum CF of a 31.5 kW solar system?

For a system with 31.5 kW_e scale, the maximum CF of 96.43% is achieved at a high LCOE of 269.3 USD/MWh_e with 4.96 solar multiple and 23.94 storage hours. The design variables do not appear to vary significantly with plant size. Fig. 8.



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