

Calculation of the number of cycles of liquid-cooled energy storage system

Is a liquid air energy storage system suitable for thermal storage?

A novel liquid air energy storage (LAES) system using packed beds for thermal storage was investigated and analyzed by Peng et al. . A mathematical model was developed to explore the impact of various parameters on the performance of the system.

How does liquid air energy storage work?

In the thermodynamic cycle of liquid air energy storage (LAES), the working fluid is ordinary atmospheric air. Atmospheric air is drawn through an air intake device and initially passes through a mechanical filter to remove dust particles.

How much liquid air is produced during the discharge cycle?

About 6.5 kg/s of liquid air is produced. During the discharge cycle, the pump consumes 7.5 kg/s of liquid air from the tank to run the turbines. The bottom subplot shows the mass of liquid air in the tank. Starting from the second charge cycle, about 150 metric ton of liquid air is produced and stored in the tank.

Is liquid air energy storage feasible?

The decreasing production costs of liquid air enable us to assess the feasibility of constructing liquid air energy storage (LAES) systems, which are particularly beneficial in regions like Kazakhstan with low electricity costs.

How much energy is stored in a thermal storage tank?

The bottom subplot shows the mass of liquid air in the tank. Starting from the second charge cycle, about 150 metric ton of liquid air is produced and stored in the tank. As seen in the scope, this corresponds to about 15 MWh of energy storage. This figure shows the performance of the hot and cold thermal stores.

How does a refrigeration cycle work?

As well as generating cold energy for pre-cooling compressed air to increase liquid air production, a refrigeration cycle can be used to cool compressed air at the compressors' inlets to reduce the amount of specific power required.

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