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Title: Efficiency of air energy storage power generation

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What is the exergy efficiency of a compressed air energy storage system?

In the exergy analysis, the results indicate that the exergy efficiency of the compressed air energy storage subsystem is 80.46 %, which is 16.70 % greater than the 63.76 % of the reference compressed air energy storage system, showing that the system integration can decline the exergy loss.

What is thermo-economic performance of a compressed air energy storage system?

The thermo-economic performance of the system is linearly related with the pressure loss of the heat exchanger. When the charging pressure is 10MPa and the discharge pressure is 3.5MPa, the system has the best performance. Keywords: above-ground compressed air energy storage system, renewable energy, thermo-economic analysis NONMENCLATURE

What is the value of compressed air energy storage technology?

The dynamic payback period is 4.20 years and the net present value is 340.48 k\$. Compressed air energy storage technology is recognized as a promising method to consume renewable energy on a large scale and establish the safe and stable operation of the power grid.

Does above-ground compressed air energy storage have a thermo-economic performance?

This essay proposes an above-ground compressed air energy storage and the thermo-economic performance are analyzed. The advantages of discharge pressure and mechanical efficiency have positive effects on round-trip efficiency of the system.

Sep 13, 2025 · At its core, Compressed Air Energy Storage Technology works on a fairly simple principle: use electricity to compress air, store it under pressure, and then release it later to ...

Jan 1, 2021 · Air separation units (ASUs), as a single industrial equipment item, accounted for a considerable proportion (4.97%) of China's national total power consumed. Therefore, ...

Sep 19, 2023 · The energy storage process includes three compressors (Com1, Com2, Com3), intercoolers and aftercooler (HX1, HX2, HX3), an air storage tank (AST), a hot water storage ...

Jun 27, 2023 · With growing public awareness of decarbonization and increasing penetration of renewable generation, energy storage is in great need. Advanced adiabatic compressed air ...

Feb 15, 2024 · The proposed system was introduced in the paper " Adiabatic compressed air energy storage system combined with solid-oxide ...

Apr 1, 2021 · The influence of renewable energy"s generation efficiency and productivity changes on the economy has become an important topic. By reviewing previous literature, it can be ...

Oct 1, 2020 · Liquid Air Energy Storage (LAES), also known as cryogenic energy storage, uses excess power to compress and liquefy dried/CO₂-free air. When power is needed, the air is ...

Jul 1, 2024 · To improve the energy efficiency and economic performance of the compressed air energy storage system, this study proposes a design for integrating a compressed air energy ...

Jun 17, 2024 · Compressed air energy storage technology has become a crucial mechanism to realize large-scale power generation from renewable energy. This essay proposes an above ...

Jan 1, 2021 · This study provides a detailed overview of the latest CAES development in China, including feasibility analysis, air storage options for CAES plants, and pilot CAES projects. ...

Apr 1, 2023 · The ideal operation area for compressed air energy storage of the power generation-efficiency operation diagram is analyzed.

Sep 19, 2023 · The energy storage process includes three compressors (Com1, Com2, Com3), intercoolers and aftercooler (HX1, HX2, HX3), an ...

Jul 21, 2023 · About Storage Innovations 2030 This technology strategy assessment on compressed air energy storage (CAES), released as part of the Long-Duration Storage Shot, ...

Apr 25, 2025 · As the world transitions to decarbonized energy systems, emerging long-duration energy storage technologies are crucial for supporting the large-scale deployment of ...

Oct 15, 2016 · As an effective approach of implementing power load shifting, fostering the accommodation of renewable energy, such as the wind and solar generation, energy storage ...

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Jan 3, 2025 · This paper develops an exergy analysis comparing three adiabatic compressed air energy storage system layouts, operating under isochoric and isobaric modes.

Oct 27, 2025 · AA-CAES stores the heat created during the initial air compression for use in the electricity generation section of the cycle. ...

Jul 16, 2025 · Technical Terms Compressed Air Energy Storage (CAES): A method of storing energy by compressing air and storing it under high pressure, which is later expanded to ...

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