

What is compressed air energy storage?

Compressed air energy storage (CAES) is a promising energy storage technology due to its cleanliness, high efficiency, low cost, and long service life. This paper surveys state-of-the-art technologies of CAES, and makes endeavors to demonstrate the fundamental principles, classifications and operation modes of CAES.

What is compressed air energy storage (CAES) system?

Compressed air energy storage (CAES) system stores potential energy in the form of pressurized air. The system is simple as it consists of air compressor, reservoir, air turbine, and a generator. At low peak energy demand, energy from a renewable source will power the air compressor and raise the pressure inside the reservoir.

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.

Does a compressed air energy storage system have a cooling potential?

This work experimentally investigates the cooling potential availed by the thermal management of a compressed air energy storage system. The heat generation/rejection caused by gas compression and decompression, respectively, is usually treated as a by-product of CAES systems.

Can compressed air energy storage systems be used for air conditioning?

This work presents findings on utilizing the expansion stage of compressed air energy storage systems for air conditioning purposes. The proposed setup is an ancillary installation to an existing compressed air energy storage setup and is used to produce chilled water at temperatures as low as 5 °C.

How much does a compressed air energy storage system cost?

In the economic analysis, the results indicate that the compressed air energy storage subsystem requires an equipment investment cost of 256.45 k\$. The dynamic payback period spans 4.20 years, as well as the net present value reaches 340.48 k\$, showing that the system integration has a good economic performance.

Initially, compressed air energy storage systems did not focus on the recovery and utilization of the heat generated by compression. The first generation of compressed air energy storage ...

Given the urgency of climate change mitigation, it is crucial to increase the practical utilization of renewable energy. However, high uncertainty and large fluctuation of ...

The intention of this paper is to give an overview of the current technology developments in compressed air energy storage (CAES) and the future direction of the technology development ...

Download Citation | On Oct 1, 2024, Xianbiao Bu and others published Efficient utilization of abandoned mines for isobaric compressed air energy storage | Find, read and cite all the ...

Compressed air energy storage (CAES) is a promising energy storage technology due to its cleanness, high efficiency, low cost, and long service life. This paper surveys state-of-the-art technologies of CAES, and ...

Motivated by the suboptimal performances observed in existing compressed air energy storage (CAES) systems, this work focuses on the efficiency optimization of CAES through thermal energy storage (TES) ...

Compressed air energy storage (CAES) is a promising energy storage technology due to its cleanness, high efficiency, low cost, and long service life. ... The development and utilization of renewable energy is an ...

Compressed air energy storage (CAES) technology stands out among various energy storage technologies due to a series of advantages such as long lifespan, ... proposed a novel ...

This study focusses on the energy efficiency of compressed air storage tanks (CASTs), which are used as small-scale compressed air energy storage (CAES) and renewable energy sources (RES). The objectives of this ...

Porous media compressed air energy storage (PM-CAES) and geologic carbon sequestration (GCS) can potentially be combined when CO₂ is used as the cushion gas. The large increase ...