

Can abandoned mines be used as compressed air storage systems?

Underground space in abandoned mines may be used as compressed air storage systems for CAES plants. The simplified schematic diagram of the CAES system is shown in Figure 1. The compressor and turbine facilities are installed above the ground, while the compressed air reservoir is underground.

Can abandoned coal mines be used as compressed air reservoirs?

In this paper, abandoned mines are proposed as underground reservoirs for large scale energy storage systems. A 200 m ³ tunnel in an abandoned coal mine was investigated as compressed air reservoir for A-CAES plants, where the ambient air is stored at high pressure.

Can abandoned mines be used for energy storage?

For more information on the journal statistics, [click here](#). Multiple requests from the same IP address are counted as one view. Million cubic meters from abandoned mines worldwide could be used as subsurface reservoirs for large scale energy storage systems, such as adiabatic compressed air energy storage (A-CAES).

Can abandoned mines be used as underground reservoirs?

Underground space from abandoned mines can be used as underground reservoirs for underground pumped storage hydropower (UPSH) and compressed air energy storage (CAES) systems [5,6,7,8,9,10,11].

How can abandoned mine facilities be used to generate energy?

Finally, a CAES plant could be established, using the upper mine galleries for underground air storage; the fact that Lieres is a "dry mine" is ideal for this type of system. Thus, the abandoned mine facilities are efficiently used to generate both electrical and thermal renewable energy. Fig. 5.

What are closed mines used for?

Closed mines can be used for underground energy storage and geothermal generation. Underground closed mines can be used as lower water reservoir for UPHEs. CAES systems store energy in the form of compressed air in an underground reservoir. The geothermal use of water from a mine allows heating and cooling nearby buildings.

Appl. Sci. 2021, 11, 2573 3 of 19 in Germany to install an A-CAES plant with a storage capacity of 360 MWh and output power of 90 MW [2]. In this paper, abandoned mines are proposed as underground ...

Abandoned mining fields can install photovoltaic and wind power, while underground tunnels can store energy, transforming abandoned mines into a renewable energy support base with ...

Accordingly, building compressed air energy storage (CAES) plants along the roadways of abandoned coal

mines can serve as a viable energy storage method while repurposing these mines.

Compressed Air Energy Storage (CAES) is one of the methods that can solve the problems with intermittency and unpredictability of renewable energy sources. The storage is charged by increasing air pressure with the use of electrically driven compressors, which convert the electric energy into potential energy. The pressurized air is stored in compressed air ...

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DOI: 10.1016/j.energy.2024.133392 Corpus ID: 273280113; Efficient utilization of abandoned mines for isobaric compressed air energy storage @article{Bu2024EfficientUO, title={Efficient utilization of abandoned mines for isobaric compressed air energy storage}, author={Xianbiao Bu and Sihao Huang and Shi Liu and Yi Yang and Jie Shu and Xianfeng Tan and Hongnian Chen ...

By levelizing the production using compressed air energy storage, the electrical generator size (and associated) cost may be reduced while maintaining the same average power production. ... Importantly, the siting of wind farms near abandoned wells and mines also has the potential for significant new infrastructure investment and jobs in areas ...

This study focuses on the renovation and construction of compressed air energy storage chambers within abandoned coal mine roadways. The transient mechanical responses of underground gas storage ...

Appl. Sci. 2021, 11, 2573 3 of 19 in Germany to install an A-CAES plant with a storage capacity of 360 MWh and output power of 90 MW [2]. In this paper, abandoned mines are proposed as underground reservoirs for large

Million cubic meters from abandoned mines worldwide could be used as subsurface reservoirs for large scale energy storage systems, such as adiabatic compressed air energy storage (A-CAES). In this paper, analytical and three-dimensional CFD numerical models have been conducted to analyze the thermodynamic performance of the A-CAES reservoirs in ...

Two main advantages of CAES are its ability to provide grid-scale energy storage and its utilization of compressed air, which yields a low environmental burden, being neither toxic nor flammable.

In the context of sustainable development, revitalising the coal sector is a key challenge. This article examines how five innovative technologies can transform abandoned or in-use coal mines into sustainable energy centres. From solar thermal to compressed air energy storage, these solutions offer a path to a more sustainable future while addressing the decline ...

This numerical simulation model for the compressed air energy storage in abandoned mines is verified by the simulation results of the Korean CAES pilot test project where Kim et al. [38] considered EDZ and used TOUGH-FLAC to analyze the coupled thermodynamics, multiphase fluid flow, and heat transfer. In their model, the cavern is represented ...

The subsequently developed Adiabatic Compressed Air Energy Storage (A-CAES) stores compressed heat and uses it to heat the air in the expansion stage ... Preliminary feasibility analysis of a hybrid pumped-hydro energy storage system using abandoned coal mine goafs. Appl. Energy, 258 (2020), Article 114007. View PDF View article View in Scopus ...

The use of abandoned underground mines as facilities for storing energy in form of compressed air has been investigated by Lutynski et al. [18] and Ishitata et al. [20] pared to underground storage caverns, CAES reservoirs are subjected to relatively high-frequency load cycles on a daily or even hourly basis.

Therefore, this paper studies the application status of underground space energy storage, especially the area of underground coal mines, and focuses on the energy storage technologies that have been carried out in the coal mines" underground levels, such as pumped storage, thermal storage energy storage, compressed air energy storage ...

In the current energy transition, abandoned mines can be used as strategic large scale energy storage systems. Lined mining drifts can store compressed air at high pressure in compressed air energy storage systems. In this paper, three-dimensional CFD numerical models have been conducted to investigate the thermodynamic performance of ...

Abandoned mines around the world have a great potential for ESS. In this work, a technical feasibility analysis of using disused mining structures from a closed coal mine at 450 m depth as underground CAES system is presented. ... An overview of potential benefits and limitations of compressed air energy storage in abandoned coal mines. IOP ...

The present study focuses on the compressed air energy storage (CAES) system, which is one of the large-scale energy storage methods. As a lot of underground coal mines are going to be closed in China in the coming years, a novel CAES system is proposed for application in roadways of the closing coal mines. ... Luo, P.; Chen, N. Abandoned coal ...

Compressed Air Energy Storage in Abandoned Mines By Bernardo Llamas, Belén Vallespir, Marcelo F. Ortega, Pedro Mora. Book Green Energy and Infrastructure. ... túnel-compressed air energy storage (CAES) concept is proposed as a solution to store renewable energy. An inventory of the possible locations for this technology has been prepared ...

The analysis shows that, (1) There is a large amount of usable space in abandoned coal mines, and eight reuse

modes of underground space in abandoned coal mines have been summarized: agricultural and forestry land, construction land, site greening, watershed utilization, water-heat combination, wetland park, mine park, and space reuse. (2) The ...

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Compressed air energy storage. Sabine Donadei, Gregor-Sönke Schneider, in Storing Energy (Second Edition), 2022. 4.5 Abandoned mines. Abandoned mines which were previously used for the extraction of commodities such as salt, ores, coal, or limestone can sometimes be used for storage of gases and liquids, depending on the local geological situation. Numerous ...

This numerical simulation model for the compressed air energy storage in abandoned mines is verified by the simulation results of the Korean CAES pilot test project where Kim et al. [38] considered EDZ and used TOUGH-FLAC to analyze the coupled thermodynamics, multiphase fluid flow, and heat transfer.

Compressed Air Energy Storage (CAES) is one of the systems that can contribute to the penetration of renewable energy sources. The pressurized air is stored in mining caverns and ...

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