

Underground Hydro-Pumped Energy Storage Using Coal Mine Goafs: System Performance Analysis and a Case Study for China Deyi Jiang^{1,2}, Shao Chen^{1,2,3}, Wenhao Liu^{1,2*}, Yiwei Ren^{1,2}, Pengyv Guo^{1,2} and Zongze Li^{1,2} ¹State Key Laboratory of the Coal Mine Disaster Dynamics and Controls, Chongqing University, Chongqing, China, ²School of Resources and ...

The number of abandoned coal mines will reach 15000 by 2030 in China, and the corresponding volume of abandoned underground space will be 9 billion m³, which can offer a good choice of energy storage with large capacity and low cost for renewable energy generation [22,23]. WP and SP can be installed at abandoned mining fields due to having large occupied area, while ...

It aims to promote the development of underground coal mine space energy storage technology. ... [14,15], compressed air energy storage [16,17], carbon dioxide and supercritical carbon dioxide energy storage [18,19], flywheel energy storage [20,21], and gravitational energy storage [22,23]; (2) Technologies for thermal energy storage, such as ...

1. Introduction. Compressed air energy storage (CAES) systems among the technologies to store large amounts of energy to promote the integration of intermittent renewable energy into the transmission and distribution grid of electric power. 1 CAES can be carried out in underground salt caverns, naturally occurring aquifers, lined rock caverns or storage tanks. 2, ...

Semantic Scholar extracted view of "Energy from closed mines: Underground energy storage and geothermal applications" by J. Menéndez et al. ... Overview of current compressed air energy storage projects and analysis of the potential underground storage capacity in India and the UK. ... Energy storage in underground coal mines in NW Spain ...

Galicía, 44, 33005, Oviedo, Spain Dep. Mining Exploitation and Prospecting, University of Oviedo, Independencia 13, 33004, Oviedo, Spain A R TICL E INFO A BSTR A CT Keywords: Energy storage Underground pumped-storage Compressed air storage Geothermal use Mine water Mining reservoir Renewable energy In the current energy transition, there is a ...

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@article{Schmidt2024TechnicalFO, title={Technical feasibility of lined mining tunnels in closed coal mines

Air energy storage in underground coal mines

as underground reservoirs of compressed air energy storage systems}, author={Falko Schmidt and Javier Menéndez and Heinz Konietzky and Zhongming Jiang and Jesus Manuel Fernández-Oro and Laura V. Alvarez and Antonio Bernardo-S ...

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]. Pumped storage hydropower (PSH) is the most mature large-scale energy storage technology, and the round trip efficiency is typically in the range of ...

Abstract. It is anticipated that utilizing the underground space in abandoned mines to build and operate pumped-storage hydroelectricity (PSH) plants can reduce capital investment and geological constraints. However, there are currently few detailed investigations into techno-economic feasibility except for conceptual studies. In this paper, an underground ...

Fig. 1 shows the main coal mining areas and salt deposits in Europe. Lignite is predominantly mined in open pits while ... Pumped storage power plants and compressed air energy storage plants have been in use for more than a hundred and forty years, re- ... the literature on underground energy storage using closed mines, as well as that for ...

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. The new system combines pumped-hydro ...

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The concept of air storage in isolated workings of closed coal mine is presented taking into account availability of such places in the Silesian Coal Basin of southern Poland. ...

The mine water from abandoned coal mines can also be used for the development of Underground Pumped Storage Power (UPSH) or Compressed Air Energy Storage (CAES) plants [18-22]. Large amounts of stored water at stable temperature and low enthalpy are suitable for the supply of sustainable thermal energy in surrounding buildings.

A high-efficiency isothermal CAES concept was theoretically and empirically developed herein and applied to a case study to evaluate the feasibility of leveraging the capacity of underground reservoirs of abandoned oil/gas wells and coal mines. Integration of underground energy storage with wind was predicted to yield a

dispatchable power ...

Those abandoned coal mine underground spaces can be re-utilized as energy storage caverns. This can also bring new infrastructure investments and employment opportunities in renewable energy [8, 15]. Thus, the re-utilization of abandoned underground coal mine spaces as storage caverns benefits both coal mines and renewable energy industries [9].

Underground coal mine workings as potential places for ... Another solution is the Compressed Air Energy Storage (CAES) which can provide power output of over 100 MW with a single unit [4]. The ...

A large number of voids from closed mines are proposed as pressurized air reservoirs for energy storage systems. A network of tunnels from an underground coal mine in northern Spain at 450 m depth has been selected as a case study to investigate the technical feasibility of adiabatic compressed air energy storage (A-CAES) systems.

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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 ...

Till date, 32 underground coal mine reservoirs have been built, with a storage capacity of 31 million m³, making it the only underground coal mine reservoir group in the world (Gu, 2015). On April 21, 2021, National Development and Reform Commission of the National Energy Administration issued the draft of Guidance on Accelerating the ...

Energy storage in underground coal mines in NW Spain: Assessment of an underground lower water reservoir and preliminary energy balance. ... Air pressure and velocity values will also be checked at the intersection between the ventilation shafts and the tunnels, where major instabilities are expected due to the abrupt changes in the tunnel ...

1. Introduction. Large scale energy storage (LSES) systems are required in the current energy transition to facilitate the penetration of variable renewable energies in the electricity grids [1, 2]. The underground space in abandoned mines can be a solution to increase the energy storage capacity with low environmental impacts [3], [4], [5]. Therefore, underground ...



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