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Abandoned mine pumping energy storage germany

Overview

Waste heat from a data center in Bochum, Germany, could be stored in an abandoned mine and used in a district heating system. The new project at Ruhr University, Bochum, aims to demonstrate the potential of Mine Thermal Energy Storage (MTES).Can abandoned mines be used for energy storage?

Closed mines can be used for the implementation of plants of energy generation with low environmental impact. This paper explores the use of abandoned mines for Underground Pumped Hydroelectric Energy Storage (UPHES), Compressed Air Energy Storage (CAES) plants and geothermal applications.

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.

Should closed mines be used for energy storage and geothermal energy plants?

The use of closed mines for the implementation of underground energy storage plants and geothermal energy plants has important environment benefits, but usually higher operation and maintenance costs (O&M) compared to conventional systems.

Can pumped deep mine water be used for geothermal energy?

The pumped warm deep mine water can be used to provide geothermal energy for the heating of the households near the mines. 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.

What is pumped Energy Storage?

Pumped storage is the largest-capacity form of large-scale energy storage available, which is essential for ensuring grid stability and supply security when conventional fuel is replaced by renewable energy sources [32, 37] and to cover peak load demand in an unstable energy environment .

How much energy is generated by underground hard-rock excavations?

The generation of energy would be 153 GWh year −1 and the electricity consumption would be 195 GWh year −1. Underground hard-rock excavations are very costly, so the relatively inexpensive raise-bore technique is preferable, when possible. The total cost of the project is estimated in 257 million euros and the cost per kW is 2215 € (Table 3).

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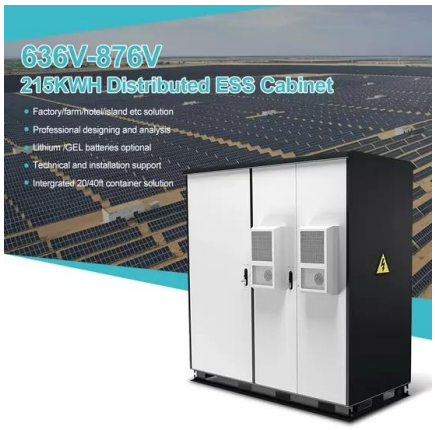
An Exploratory Economic Analysis of Underground Pumped ...

The focus of the present study is on pumped-storage hydro power (PSHP) plants, and the techno-economic viability to install them under ground in abandoned coal ...

An Exploratory Economic Analysis of Underground ...

PDF , This study researches the concept of underground pumped-storage hydro power plants in closed-down underground hard coal mines in Germany.



Mine thermal energy storage (MTES) systems in abandoned ...

Up to this point only one high temperature MTES pilot plant (Bochum, Germany) has been established within the framework of the HEATSTORE project, in which the possibility of ...

Current research on aquifer thermal energy storage (ATES) in Germany

This paper reviews the current research on

aquifer thermal energy storage (ATES) and mine thermal energy storage (MTES) in Germany providing descriptions of 3 low ...

Utilization of resources in abandoned coal mines for carbon ...

Under the new vista of carbon neutrality, all industries in China face new challenges. As the pillar industry for fossil energy, the coal industry cannot blindly "de-coal". It ...

Recovery of the Geothermal Energy Stored in Abandoned ...

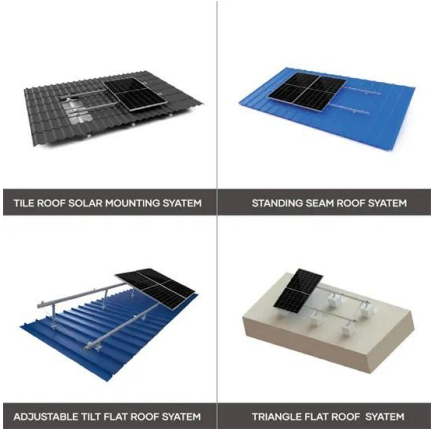
Abstract. Abandoned mines are already being used for various purposes, ranging from ultimate waste disposal to energy storage and the heating and cooling of spaces. Some examples of ...

Bochum, Germany to Extract Geothermal Heat ...

Construction is currently ongoing for new buildings that will be served by a planned geothermal heating project in Bochum, Germany that aims to utilize water from abandoned coal mine shafts for emissions-free ...

Underground Pumped-Storage Hydroelectricity ...

This paper explores the use of abandoned mines for Underground Pumped Hydroelectric Energy Storage (UPHES), Compressed Air Energy Storage (CAES) plants and geothermal applications.



The reuse of abandoned coal mines: geological and mining ...

Abstract The research presented in this thesis explores the innovative utilisation of abandoned coal mines for energy storage and production. This addresses the energy storage needs driven ...

An Exploratory Economic Analysis of Underground Pumped ...

The focus of the present study is on pumped-storage hydro power (PSHP) plants, and the techno-economic viability to install them under ground in abandoned coal mines, even in densely ...

Bochum (Germany)

Bochum (Germany) Demo site for Mine Thermal Energy Storage (MTES). In Bochum, currently abandoned mines formerly used for hard coal production are being transformed into a Mine Thermal Energy Storage (MTES). The ...

Frontiers , Pumped storage power station using ...

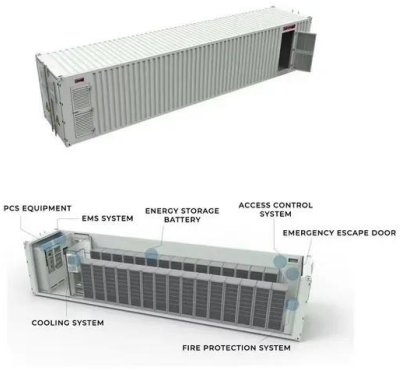
As an energy basin, the Yellow River basin is a key demonstration area to promote energy system reform in China. There are a large number of abandoned mines in the Yellow River basin, which ...

Study on the division and calculation of reservoir capacity in ...

As countries advance toward low-carbon energy systems, the dual challenge of repurposing abandoned mine resources and addressing the intermittency of renewable energy has gained ...

German national project

Concept The aim of the German HEATSTORE sub-project is to create a technically and fully functional high temperature mine thermal energy storage (HT-MTES) pilot plant (see fig. 1) for ...



Analysis of geothermal heat recovery from abandoned coal mine ...

Therefore, by means of heat pump technologies, abandoned mine water provides another energy-efficient and environment-friendly approach to satisfy the requirement of clean ...

Turning Water Pollution Sources Into Assets: Exploring Innovative

The latter range from using mines (included flooded ones) for the storage of electrical energy via different technologies, harvesting geothermal energy from mine water and voids to different ...

Research on development demand and potential of pumped storage ...

Considering the closure of global underground mines and the development of energy storage technologies, underground pumped storage power plant (UPSP) is ...

Transformation of abandoned open-pit coal mines into pumped ...

Scheduled decommissioning of lignite mining in Europe requires innovative and economic strategies to support coal regions in transition. ATLANTIS will assess the feasibility ...

Pumped Storage Hydropower in Abandoned Mine ...

The quest for carbon neutrality raises challenges in most sectors. In coal mining, overcapacity cutting is the major concern at this time, and the increase in the number of abandoned mine shafts is a pervasive ...

German Coal Mine to Be Reborn as Giant Pumped Storage Hydro Facility

Pumped Storage Plan The crucible of Germany's industrial revolution, North-Rhine Westphalia generates a third of the nation's power -- much of it using aging coal plants. ...

Foreign Pumped Storage Power Stations: Engineering Marvels ...

Ever wondered how countries like Germany and Japan keep their lights on while phasing out fossil fuels? Enter foreign pumped storage power stations - the unsung heroes of ...

Reviving disused mines: pumped storage solutions ...

Reviving disused mines: pumped storage solutions for a sustainable future Rehabilitating disused mining sites is a becoming a global problem that will require multiple solutions to address it. Repurposing ...

How abandoned mines can become clean energy ...

An international team of researchers has developed a novel way to store energy by transporting sand into abandoned underground mines. The new technique, called Underground Gravity Energy Storage

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This paper proposes to fi use abandoned coal mine goafs serving as large-scale pumped hydro storage (PHS) reservoir. In this paper, suitability of coal mine goafs as PHS underground ...

Optimization of the capacity configuration of an abandoned mine ...

Then, by combining the abandoned mine data, eight different sets of parameters of pumped storage are selected for the optimal configuration study, and the factors ...

Energy storage in old mines could be the next big ...

Scientists at Michigan Technological University in Houghton believe it may be possible for hundreds of abandoned mines scattered across the U.P. to be transformed into pumped water storage

The Reutilization of a Small Coal Mine as a Mine Thermal ...

The aim of the German HEATSTORE sub-project is to create a technically and fully functional high temperature mine thermal energy storage (HT-MTES) pilot plant for the energetic reuse of ...

Abandoned mine could store data center waste ...

Waste heat from a data center in Bochum, Germany, could be stored in an abandoned mine and used in a district heating system. The new project at Ruhr University, Bochum, aims to demonstrate the potential ...

Clean energy project at old mine could provide ...

A technology that generates power by pumping and recirculating water between two reservoirs may soon be in place at an abandoned Ontario iron ore mine. The technology, known as closed-loop ...

Pumped storage hydropower in an abandoned ...

Many coal mines are being abandoned for economic and environmental reasons in China. The repurposing of abandoned open-pit coal mines into pumped storage hydropower (PSH) can help with the ...

Challenges and opportunities of energy storage technology in abandoned

In addition, the technology of using underground coal mine space for energy storage has become an effective means to promote the development of low-carbon clean ...

Mine Thermal Energy Storage (MTES)

Prevention of intake of oxygen into the mine water system is a key for a durable operation of the storage system. Otherwise a rapid precipitation of iron minerals (i.e. ferrihydrite) may occur.

Abandoned Coal Mines Are Becoming the ...

A gravity energy storage prototype created by Gravitricity in Edinburgh. Courtesy of Gravitricity This approach not only gives these disused mines a second life but also offers economic and environmental ...

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