Coal mine tunnel energy storage system

The use of abandoned coal mine tunnels as underground compressed air energy storage (CAES) facilities has garnered significant attention given that it effectively repurposes unused underground space and enhances the efficiency of renewable energy utilization.

Over the past 50 years (1965-2014), the world cumulatively consumed 235 billion tons of coal, 160 billion tons of oil and 97 trillion cube of gas, leading to massive carbon emissions and causing various types of environmental pollution [1] the framework of the Paris climate agreement, national governments had to take firm actions to increase the share of ...

Moreover, the proposed systems can be combined renewable energy storage, such as wind and solar power and with geothermal energy exploitation, taking advantage of the temperature of the deep mine water and also they can be combined with a system of mine water use as a water resource, for drinking supply, agricultural or industrial use.

We have studied three plans for re-use of the abandoned mine roadway tunnels as an energy center. These are the thermostat plan, the thermal accumulator plan, and the CAES plan. Calculations show that the thermostat plan can provide over 15,000 m 2 of building air-conditioning/heating load for each kilometer of roadway, but electric power is needed to run ...

To this end, we first present a structure for coal mine integrated energy systems by integrating these forms of associated energy together with some flexible load. The multi-objective dispatch model of the system is then derived by considering the economic cost, carbon transaction cost for environment protection and degree of customer ...

This study focuses on the renovation and construction of compressed air energy storage chambers within abandoned coal mine roadways. The transient mechanical ... is attracting attention as one of large-scale renewable energy storage systems. Its gas storage chamber is one of key components for its success. ... The rock around tunnels used for ...

Cao et al. [17] proposed a new type of CO 2 energy storage and power generation system that involves the sealing of CO 2 in abandoned coal mine tunnels and they explained its working principle. Liu [18] studied the thermodynamic characteristics and thermal economy of a supercritical compressed CO 2 energy storage system that utilizes ...

Mining facilities and mine water in underground mines, and biomass in open pit mines, could be used for clean energy production or energy storage systems. Underground mining facilities can be used ...

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 chambers under a cycle are analyzed through thermal-solid coupling simulations. These simulations highlight changes in key parameters such as displacement, ...

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

In this paper, four mining levels in a closed coal mine in the Asturian Central Coal Basin (NW Spain) have been selected as a case study to investigate the technical feasibility of underground compressed air energy storage systems. First, in order to determine the suitable level and type of concrete lining, a numerical model has been established to analyze 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 ...

mines are proposed as pressurized air reservoirs for energy storage systems. A network of tunnels from . 18 . an underground coal mine in northern Spainat 450 m depth has been selected as a case study to . 19 . investigate the technical feasibility of adiabatic compressed air energy storage (A-CAES) systems. The . 20

During the last decades, the Asturian Central Coal Basin (ACCB) has been a highly exploited coal mining area by means of underground mining and its network of tunnels extend among more than 30 mines. Parts of this infrastructure will soon become available for alternative uses since most of the coal mining facilities in Spain will fade out in 2018.

Keywords: pumped hydro storage, clean energy, coal mines, feasibility analysis, case study. Citation: Jiang D, Chen S, Liu W, Ren Y, Guo P and Li Z (2021) Underground Hydro-Pumped Energy Storage Using Coal Mine Goafs: System Performance Analysis and a Case Study for China. Front. Earth Sci. 9:760464. doi: 10.3389/feart.2021.760464

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 ...

Web: https://www.arcingenieroslaspalmas.es