Development of underground pumped water storage science network

Are underground pumped storage power stations sustainable?
Underground pumped storage power stations (UPSPS) using abandoned coal mines efficiently utilize the coal mine space and promote renewable energy applications. This paper introduces a novel framework to evaluate the UPSPS regional development potential in the Yellow River Basin (YRB) from the perspective of sustainable development.

What is the regional development potential of underground pumped storage power stations?
The regional development potential of underground pumped storage power stations (UPSPS) is defined. A novel framework to evaluate the regional development potential of UPSPS is constructed from a sustainable perspective. The decision-making process is based on the four-quadrant method incorporating bubble diagrams.

When was underground pumped storage developed?
In 1969, Sorensen considered the development of underground pumped storage to be promising. Around the same time, several Swedish engineers proposed developing underground cavern-based lower reservoirs to complement surface reservoirs for pumped storage .

What is underground pumped storage power systems (UPSP)?
The utilization of Underground Pumped Storage Power Systems (UPSP) addresses the growing need for energy storagein the face of increasing intermittent energy sources. Simultaneously,the closure of mining activities has resulted in vast underground spaces potentially becoming available for alternative purposes.

Are underground pumped storage power plants a viable solution?
Therefore,Underground Pumped Storage Power Plants (UPSP),as first introduced in the early 20th century by Fessenden ,offer a viable solutionthat capitalizes on the utilization of abandoned underground spaces and effectively circumvents topographical constraints and limitations associated with surface footprint [5,12].

What are underground space utilization modes based on underground water reservoir?
Thus, in this present stage, there are three underground space utilization modes based on underground water reservoir: storage and filtration of mine water, pumped hydroelectric storage plants system, and geothermal utilization model.

The pumped hydro energy storage (PHES) is a well-established and commercially-acceptable technology for utility-scale electricity storage and has been used ...

In the last decade, interest in bulk Electrical Energy Storage (EES) technologies has grown significantly as a potential solution to some of the challenges associated with ...

Development of underground pumped water storage science network

Although pumped storage hydropower (PSH) has been around for many years, the technology is still evolving. At present, many new PSH concepts and technologies are being proposed or ...

Abstract Electricity storage systems are necessary to increase the efficiency of variable renewable energies. Mine water in closed underground coal mines can be used for ...

This paper introduces the key technologies and challenges associated with underground pumped storage, including the current situation of underground engineering construction and operation, ...

However, the most basic site selection problem of underground pumped storage power plants using waste coal mines has rarely been studied due to the complexity of the ...

The low energy density of PHS systems necessitates either a large volume of water or a significant height difference. Pumped hydro storage is the highest-capacity form of ...

Electricity storage systems are necessary to increase the efficiency of variable renewable energies. Mine water in closed underground coal mines can be used for ...

The Nant de Drance pumped storage hydropower plant in Switzerland can store surplus energy from wind, solar, and other clean sources by pumping water from a lower ...

Large-Scale Underground Energy Storage (LUES) plays a critical role in ensuring the safety of large power grids, facilitating the integration of renewable energy ...

This study provides a detailed review of China"s latest developments in PSPPs, including the current status of conventional PSPP projects, models, and the application ...

9%· Abstract Every year in China, a significant number of mines are closed or abandoned. The pumped hydroelectric storage (PHS) and geothermal utilization ...

The development of pumped storage power plants using abandoned mines not only facilitates the effective use of underground space, ecological restoration and local ...

Underground pumped storage power stations (UPSPS) using abandoned coal mines efficiently utilize the coal mine space and promote renewable energy applications. This paper introduces ...

Underground Pumped Storage Hydropower (UPSH) is a potential alternative to manage electricity production in flat regions. UPSH plants will interact with the surrounding ...

Development of underground pumped water storage science network

Compared with aboveground energy storage technologies (e.g., batteries, flywheels, supercapacitors, compressed air, and pumped hydropower storage), UES ...

This review shows that underground pumped storage is technologically feasible, economically feasible, and has obvious advantages. Thus, the authors of this paper suggest that China ...

Reduced environmental impacts, deep, non-flooded shafts and abundance of water from underground run-off, make coal mines in ACCB suitable for the development of ...

Overall, this study synthesises and categorises the drivers and barriers to the development of pumped hydro energy storage. Study findings will be useful to both ...

Moreover, key activities that can help accelerate PSH developments in the United States include (1) the development of tools to allow owners/operators of pumped storage hydropower plants ...

This paper focuses on the development of PHES in China. Thanks to a rapid development of China"s economy in the recent years, PHES has gained a fast development. At ...

This paper presents China"s current development of pumped storage plants, their role in the electric power system, the management models for pumped storage plants and ...

The pumped storage power station (PSPS) is a special power source that has flexible operation modes and multiple functions. With the rapid economic development in ...

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

In this paper, on the base of the future development of clean and low-carbon energy, the concept and connotation of underground energy storage engineering (UESE) was proposed and ...