# Tunnel energy storage profile

Underground gas storage is an important component of large-scale CAES power stations. At present, underground gas storage has two main types. The first type includes special geological structures, such as salt karst caverns that have been exploited, geological structures for gas and oil storage, and underground aquifers [[4], [5], [6]].Meanwhile, the ...

This work focuses on tunnels equipped with ground heat exchangers, typically called energy tunnels, to serve as seasonal, medium-temperature underground thermal energy storage ...

Among technologies developed since the late 1970s, the use of underground spaces as an energy storage medium - Underground Thermal Energy Storage (UTES) - has been investigated and closely ...

Transparent heat-insulation glass (HIG) with a highly selective light-absorbing coating and an energy-storage blanket (ESB) loaded with phase change materials show considerable potential in ...

As the preferred medium for tunnel energy storage system (TESS), lithium-ion batteries (LIBs) are widely used in tunnel lighting, ventilation, fire protection, monitoring, and communications. Once the LIBs are thermally out of control, causing fire and explosion, its flammable and toxic fumes will spread in large quantities in the tunnel, seriously affecting the safety of the tunnel.

The ever-increasing market demand for grid-scale energy storage systems (EESs) urgently needs to develop state-of-the-art energy storage technologies with high conversion efficiency and cost-effectiveness. 1-4 Sodium-ion batteries (SIBs), with remarkable merits in rich abundance and worldwide distribution of sodium resources, resultant low cost ...

This study aimed to identify impacts of changes in subsurface environments on the thermal energy storage performance of un-derground tunnels used as heat exchangers. The findings ...

Abstract In this present study, two similar solar tunnel dryers with different sensible and latent heat energy storage configurations were designed, realized and experimentally investigated. In this view, the performance of natural convection solar tunnel dryer has been investigated. Meanwhile, the performance of a natural convection solar tunnel dryer ...

Owing to the limitations, such as low energy efficiency, high cost, and lack of environmental friendliness, of conventional tunnel cooling methods, a novel cold energy storage technology using ...

An innovative energy storage technique of phase change plates (PCPs) using tunnel lining ground heat ex-changers (GHEs) for cool storage facilitates the geothermal energy extraction and usage ...

The energy storage time of the PCP reduces by 70.7% and 53.0% when the PCM latent ... 103 behavior of GHEs installed in tunnel energy textiles with or without the drainage layer under

This paper focuses on the energy management of a tunnel DC power supply system containing photovoltaic power (PV) generation and energy storage equipment, taking into consideration the TILS. Firstly, a model of TILS is established to fully consider factors such as brightness outside the tunnel, vehicle speed, and traffic flow.

For compressed air energy storage (CAES) caverns, the artificially excavated tunnel is flexible in site selection but high in sealing cost. A novel concept of building a water-sealed CAES tunnel in the seabed is proposed in this study, and the airtightness of the system is preliminarily evaluated.

Investigating the construction mechanics of a ventilation tunnel using the TBM (Tunnel Boring Machine) pilot and enlargement method with reliable rock mechanics parameters ensures the safety of on-site excavation operations. Leveraging the construction project of the ventilation tunnel at the Wuhai Pumped Storage Power Station, TGP sidewall forecasting was ...

Compressed air energy storage (CAES) is a buffer bank for unstable new energy sources and traditional power grids. The stability of a CAES cavern is a key issue to cavern safety.

A reasonable and applicative tunnel light environment is important to ensure driving safety. This review aims to contribute to this growing area of research by exploring the tunnel lighting, which expands from safety to visual comfort, energy saving, and low carbon This paper employs bibliometric method to a visual analysis of the relevant literature and ...

The tunnel GHEs, the surrounding ground, and the tunnel air constitute the energy tunnel systems. Understanding the heat transfer mechanism in each component is vital ...

Experimental study on drying kinetics for Zingiber Officinale using solar tunnel dryer with thermal energy storage. Author links open overlay panel Y. Raja Sekhar a, Adarsh K. Pandey c, I.M. Mahbubul d ... During the forced convection process, a mass flow of 0.018 kg/s was maintained during the drying process. The profile in Fig. 8. depicts the ...

Low geo-temperature geothermal energy in the surrounding rock can be extracted by tunnel lining ground heat exchangers (GHEs) and stored in phase change material (PCM) plates to realize the cold energy utilization. However, the research of the coupling heat transfer of tunnel lining GHEs and PCM plates has been rarely reported. In this study, a 3D coupling heat transfer model of ...

SSE completes exploratory tunnel for potential pumped storage 13 Aug 2024 by energyglobal Exploratory tunnelling at the site of what would be the UK"s first large scale pumped storage scheme to be developed in 40

years is now complete. ... moving the project closer to offering a huge boost for the UK"s renewable energy storage," added ...

This paper presents an unprecedented investigation of the thermal energy storage potential of underground tunnels used as heat exchangers, often called energy tunnels, with a focus on seasonal, medium-temperature thermal energy storage applications. ... These are operations characterized by different charging-discharging profiles, charging ...

Most of all, completing the cold energy storage of PCM plates based on tunnel lining GHEs is an essential precondition to implement this novel method for the tunnel cooling. ... The cross profile of PCM plates is located in the centerline cross section of the cuboid shape plates. At the start of the cold energy storage process, the heat ...

Exceptionally high-energy tunnel-type V1.5Cr0.5O4.5H nanocomposite as a novel cathode for Na-ion batteries ... carbon brings about a flat voltage profile at ?1.6 V, providing a large capacity of ...

The solar tunnel or greenhouse dryer is easy to construct, saves energy, is cheap, easy to load and unload materials, and is best suited for bulk drying and rural areas (Patil and Gawande, 2016). Bala and Mondol (2001) investigated the performance of a solar tunnel dryer using salted silver jewfish at the drying air temperature of 35 to 52 ...

Compressed air energy storage (CAES) is a large-scale energy storage technology that can overcome the intermittency and volatility of renewable energy sources, such as solar and wind energy.