

Coal mine tunnel energy storage system diagram

Can compressed air energy storage be used in underground mine tunnels?

Compressed air energy storage (CAES) in underground mine tunnels using the technique of lined rock cavern (LRC) provides a promising solution to large-scale energy storage. A coupled thermodynamic and thermomechanical modelling for CAES in mine tunnels was implemented. Thermodynamic analysis of air during CAES operation was carried out.

How many underground spaces are available in coal mines?

Investigations (Xie et al.,2018) shows that a volume of approximately 580 Mm³ underground spaces (shafts and roadways in operational coal mines) in the operational coal mines was available in major coal-producing provinces by the end of 2016 (Fig. 2 a).

Can underground water and energy storage be used in abandoned coalmines?

Referencing to successful cases and considering the ecological characteristics of abandoned coalmines in China, Xie et al., 2015, Yuan et al., 2018, and Gu (2015) have presented concepts for underground water and energy storage in underground coalmine spaces.

How thick is a mine tunnel?

The original cross-section of the mine tunnel measures 4 m by 4 m,with the support zone,the concrete lining,the sliding layer and the steel liner having thickness of 4 m,0.5 m,0.01 m and 0.02 m,respectively. This configuration leaves a 2.94 m circular cross-section for air storage.

Can CAES be used in underground mine tunnels?

CAES in underground mine tunnels using the technique of LRC provides a promising solution for storing large amounts of energy. Although CAES in LRC tunnels has been extensively studied both theoretically and experimentally,commercial CAES facilities employing the technique of LRC were unheard of. Several theoretical issues are yet to be resolved.

How to simulate the stability of underground coal pillar?

At present,UDEC,FLAC 3D and many other models/software can be used to simulate the stability of underground coal pillar (Wang and Zhang,2019,Bai et al.,2017a,Bai et al.,2017b). The strength weakening of the coal can be calculated according to the water content based on the laboratory test results (Bai et al.,2016).

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