

# CAVE ENERGY STORAGE MODEL



What is the storage capacity of air exergy in the cavern? Depending on different CAES systems and operations, storage capacity of air exergy in the cavern varies. In this section, taking the Huntorf CAES plant as a case study, exergy storage capacity of the compressed air in the cavern are evaluated in different operational scenarios and heat transfer conditions.



Does a cavern have a total exergy capacity and power rating? Thermodynamic responses of the compressed air in the cavern determine the total exergy capacity and power rating of the CAES system. This investigation considers two cavern operation modes of storing compressed air, including uncompensated isochoric air storage and compensated isobaric air storage.



How to estimate exergy storage capacity of isothermal cavern? Exergy storage capacity of the isothermal cavern wall condition,  $B, V, T$ , can be estimated by analytic expressions as shown in Eq. (11). For the caverns with CHT and adiabatic wall condition, numerical integration is used for estimating the exergy storage capacity with the transient pressure and temperature during the charging period.



How much exergy can a cavern store? The total maximum exergy storage capacity of the underground facility is between 29,583 to 40,401 MW·h when the cavern is fully charged for application of CAES. Estimating the realistic heat transfer using the CHT condition, it indicates the approximated 35,271 MW·h can be stored in the Hornsea/Atwick cavern facility.



Does a salt cavern-based CAES system have exergy storage capacity? The study presents a methodology to investigate the exergy storage capacity of a salt cavern-based CAES system. Two operational scenarios of the cavern and three heat transfer conditions are investigated. In an uncompensated cavern, isochoric operation of compressed air is assumed.

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Can salt caverns be used for energy storage? Storage of green gases (eg. hydrogen) in salt caverns offers a promising large-scale energy storage option for combating intermittent supply of renewable energy, such as wind and solar energy. Caverns are artificially created by a controlled dissolution mining process within the host rock formation 1.



An underground horizontal salt cavern sediment void oil energy storage method was proposed. A 3D geo-mechanical model with the sediment particle was built to analyze stability. ???



This paper examines numerical approaches to model operation of gas storage in salt caverns. The emphasis is on taking into account the thermal exchanges between the well, the cavern, ???



To evaluate the stability of a lined rock cavern (LRC) for compressed air energy storage (CAES) containing a weak interlayer during blasting in the adjacent cavern, a newly ???



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