

## Solar Energy South Africa

# Underground energy storage system maze



## Overview

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What are the different types of energy storage technologies?

The technologies considered in this article are: Underground Gas Storage (UGS), Underground Hydrogen Storage (UHS), Compressed Air Energy Storage (CAES), Underground Pumped Hydro Storage (UPHS) and Underground Thermal Energy Storage (UTES).

What is deep underground energy storage?

Deep underground energy storage is the use of deep underground spaces for large-scale energy storage, which is an important way to provide a stable supply of clean energy, enable a strategic petroleum reserve, and promote the peak shaving of natural gas.

What are the different types of underground energy storage technologies?

For these different types of underground energy storage technologies there are several suitable geological reservoirs, namely: depleted hydrocarbon reservoirs, porous aquifers, salt formations, engineered rock caverns in host rocks and abandoned mines.

Can underground energy storage systems be mined?

On one hand, during construction or operation of underground energy storage systems, water inflow could be so great that mining or operation would be impossible. On the other hand, in arid regions or within the unsaturated zone, absence of both capillary water and water at hydrostatic head may prevent storage within a mined cavern.

Is underground hydrogen storage a viable solution for large-scale energy storage?

This review paper provides a critical examination of underground hydrogen storage (UHS) as a viable solution for large-scale energy storage, surpassing 10 GWh capacities, and contrasts it with aboveground methods.

Are underground reservoirs suitable for large-scale energy storage?

The underground reservoirs for large scale energy storage are described. An extensive review of the criteria for site screening underground reservoirs is done. Large-scale underground energy storage technologies and reservoir types are matched. General criteria to all reservoir types are assessed.

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### HEATSTORE Project Update: High Temperature Underground Thermal Energy

Underground thermal energy storage (UTES) provides large scale (potentially >10 GWh) storage capacity per site that is difficult to achieve with other heat storage technologies, and benefits ...

### Characterizing Hydrogen Storage Potential in U.S.

Large-scale, long-duration H<sub>2</sub> storage will be an essential component of the supply chain necessary to balance the mismatches between energy supply and demand and to remedy intermittent disconnects in energy ...



### Development status and prospect of underground thermal energy storage ...

Numerical modeling of aquifer thermal energy storage system. Energy, 35(12): 4955-4965. DOI: 10.1016/j.energy.2010.08.029. Larsen H, Sonderberg P. 2015. DTU International Energy ...

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