Groundwater energy storage research

Why is groundwater important?
Groundwater provides invaluable freshwater for public and private supply, agriculture, industry and recreation across the UK and globally. Maps of groundwater resources for public supply in the UK show the regional variation in reliance on groundwater supplies.

How does groundwater interact with energy?
The interaction of groundwater and energy arises in a variety of ways: it plays a vital role in a number of renewable energy technologies, including deep (high enthalpy) geothermal energy production and shallow (low enthalpy) ground source pumps

Why is the subsurface a risk to groundwater?
the subsurface can be a repository of materials arising from energy production processes,such as radioactive waste from nuclear power generation and carbon dioxide from combustion-powered electricity generation: these pose a risk to groundwater when carried out onshore

Does groundwater increase heat losses?
The short-term PTES had,on average,15% higher heat losses than the seasonal PTES due to higher storage temperatures. Static groundwater increased the PTES heat losses by 14%,and for moving groundwater,the heat losses were increased by 60% compared to a case without groundwater.

Does groundwater affect PTEs heat loss?
PTES heat losses were unaffectedby the presence of groundwater when the groundwater table was 13 m below the bottom of the PTES. The groundwater layer could maintain a temperature lower than 25 °C at a depth of 20 m for seasonal PTES operation while at 30 m for short-term operation.

Can groundwater temperature be maintained below 20 °C?
The groundwater temperature was maintained below 20 °C for the seasonal operation at a groundwater depth of 25 m,whereas this was not possible for the short-term operation. These conclusions can be used primarily in the planning stage of a PTES for choosing a construction location based on geological conditions.

The data show that the groundwater circulation by the ATES system can impact chemical groundwater quality by introducing shallow groundwater with a different chemical ...

The investigations on the CSS and the modified solar still (MSS) with hollow fins and energy storage, pond fibres, and sisal fibres are conducted to analyze the effect of energy storage and ...

Numerous solutions for energy conservation become more practical as the availability of conventional fuel resources like coal, oil, and natural gas continues to decline, and their prices continue to rise [4].As climate

change rises to prominence as a worldwide issue, it is imperative that we find ways to harness energy that is not only cleaner and cheaper to use but ...

This study assesses the influence of ATES on groundwater chemistry by means of a literature review, and a comparison of groundwater quality monitoring data at seven ATES systems with ambient ...

In this paper, we discussed the influences of AR for controlling land subsidence on: (1) groundwater level and land subsidence rate, (2) groundwater quality, (3) aquifer thermal energy storage.

Aquifer Thermal Energy Storage (ATES) is a reasonable method, to balance the seasonal offset and mismatch between thermal energy demand and supply (Doughty et al. 1982;Dincer 2002; Dickinson et al ...

Based on the rationale that there will be no renewable energy future without energy storage, research has also recently started to explore the thermal energy storage potential of energy geostructures due to their promise to use the ground as a thermal battery 28, 29, 30.To date, only one study has explored the thermal energy storage potential of energy tunnels, ...

Pump Hydro Energy Storage (PHES) systems in groundwater flooded quarries are studied. o Numerical simulation is used to study the environmental impact of these systems. o Groundwater head fluctuations in the quarry and the adjacent aquifer are simulated. o Distance of influence of PHES system in the surrounding rock media is calculated. o

Water pit thermal energy storage (PTES) systems have proven a cheap and efficient storage solution for solar district heating systems. This is partly due to their low cost, ...

An interesting provider of such renewable energy is Aquifer Thermal Energy Storage (ATES), where groundwater in the aquifer is used as storage medium for summer heat and winter cold.

If groundwater flow direction is parallel to an aquifer thermal energy storage (ATES), the warm well can no longer be utilized as a heat source during the winter season because of the reduced heat ...

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