Utah aquifer thermal energy storage

Aquifer thermal energy storage (ATES) uses naturally occurring underground water to store energy that can be used to heat and cool buildings. When paired with wind and solar ...

Aquifer Thermal Energy Storage (ATES) is an increasingly popular type of shallow geothermal energy, which relies on aquifers to seasonally store thermal energy for the heating and cooling of buildings. The Netherlands are currently a world leader for ATES technology, due to a combination of easily accessible aquifer resources, dense urban

Low temperature (<25 °C) Aquifer Thermal Energy Storage (ATES) systems have a world-wide potential to provide low-carbon space heating and cooling for buildings by using ...

The disparity between energy production and demand in many power plants has led to increased research on the long-term, large-scale storage of thermal energy in aquifers. Field experiments have been conducted in Switzerland, France, the United States, Japan, and the People"s Republic of China to study various technical aspects of aquifer ...

High-temperature aquifer thermal energy storage (HT-ATES) is a cost-effective and suitable technology to store large amounts of energy. ... He currently serves as the Managing Principal Investigator of Utah"s Frontier Observatory for Research in Geothermal Energy (FORGE), a U.S. Department of Energy initiative to develop Enhanced Geothermal ...

Aquifer thermal energy storage (ATES) Description of the technology In an aquifer thermal energy storage (ATES), excess heat is stored in subsurface aquifers in order to recover the heat at a later stage. The thermal energy is stored as warm groundwater. The groundwater is also used as a carrier to transport the heat to and from the subsurface.

ATES - Aquifer Thermal Energy Storage. ATES 101 Animation (Plan View) What is ATES? ATES is an innovative open-loop geothermal technology. It relies on seasonal storage of cold and/or warm groundwater in an aquifer. The technology was developed in Europe over 20 years ago and is now in use at over 1,000 sites, mostly in The Netherlands and ...

The feasibility of CO 2-based aquifer thermal energy storage system has been investigated.. Heat extraction power can reach 8274.36 kW. o Heat recovery efficiency can exceed 79.15 %. o The effect of various factors on the water coning was studied.

amounts of energy with minimal footprint on the land surface. Storage mechanisms in the subsurface can be divided into mechanical (pressure), chemical (gas), and thermal. Thermal energy storage, in the form of

aquifer thermal energy storage, is the concept of injection of a hot

OverviewSystem typesHistoryTypical dimensionsHydrogeological constraintsLegal statusContaminated groundwaterSocietal impactsAquifer thermal energy storage (ATES) is the storage and recovery of thermal energy in subsurface aquifers. ATES can heat and cool buildings. Storage and recovery is achieved by extraction and injection of groundwater using wells. Systems commonly operate in seasonal modes. Groundwater that is extracted in summer performs cooling by transferring heat from the building to the water by means of a heat exchanger. The heated groundwater is reinjected into the aquifer, which stores ...

Aquifer Thermal Energy Storage (ATES) systems are considered a pillar to decarbonize the global energy system [17, 18], and mainly in dense urban centres, because of their small surface footprint compared and their ability to cover base load demand [19]. ATES advantages include very large storage potential, shifting of thermal loads in time ...

The 12th International Conference on Energy Storage 1 INNO-U-21 High-temperature aquifer thermal energy storage (HT-ATES): sustainable and multi-usable Benno Drijver, Martijn van Aarssen, Bas de ...

First feasibility study on aquifer thermal energy storage using nearby Seyhan Lake was realized for the new annex of Çukurova University Hospital. 3,250 MWh of electricity for cooling and 1,000 tons of oil for heating were estimated to be saved annually with a calculated payback time of less than two years. In a joint study, carried out with ...

High-temperature aquifer thermal energy storage (HT-ATES) is a cost-effective and suitable technology to store large amounts of energy. HT-ATES has been demonstrated to be an efficient and stable tool to buffer seasonal imbalances and significantly reduce greenhouse gas emissions. Fractured reservoirs are widespread in sedimentary basins ...

Aquifer thermal energy storage (ATES) has significant potential to provide largescale seasonal cooling and heating in the built environment, offering a low-carbon alternative to fossil fuels. To deliver safe and sustainable ATES deployments, accurate numerical modelling tools must be used to predict flow and heat transport in the targeted aquifers. This paper ...

Being a heat source or sink, aquifers have been used to store large quantities of thermal energy to match cooling and heating supply and demand on both a short-term and long-term basis. The current technical, economic, and environmental status of aquifer thermal energy storage (ATES) is promising. General information on the basic operation principles, design, ...

Underground thermal energy storage (UTES) is a form of STES useful for long-term purposes owing to its high storage capacity and low cost (IEA I. E. A., 2018).UTES effectively stores the thermal energy of hot and cold seasons, solar energy, or waste heat of industrial processes for a relatively long time and seasonally (Lee, 2012) cause of high thermal inertia, the ...

With the world"s need for energy rising, scientific energy use has emerged as a crucial component of future sustainable development [1, 2].The demand for heating and cooling in the built environment accounts for around 40% of the world"s total primary energy consumption [3, 4].Underground thermal energy storage (UTES) is a practical way to lower this energy ...

Abstract. Aquifer thermal energy storage (ATES) has proven to be an effective way to mitigate energy production and supply issues. Drilling branching holes from traditional vertical wells can enhance the injection and production capacity of the ATES system. There are many influencing parameters and evaluation indexes of ATES system with multilateral wells. It is ...

Aquifer thermal energy storage systems can largely contribute to climate-friendly heating and cooling of buildings: Heated water is stored in the underground and pumped up, if needed. Researchers of Karlsruhe Institute of Technology (KIT) have now found that low-temperature aquifer thermal energy storage is of great potential in Germany. ...

utilize more subsurface space for thermal energy storage while safeguarding individual system performance. The basic principle is that the loss of thermal energy to the aquifer is reduced when the warm water (or cold water) zones of ATES systems overlap each other. For example, Bakr et al. (2015) found a performance increase of 1%

Aquifer thermal energy storage (ATES) represents a promising solution for heating and cooling, offering lower greenhouse gas emissions and primary energy consumption than conventional technologies. Despite these benefits and the widespread availability of suitable aquifers, ATES has yet to see widespread utilisation, with uptake highly concentrated in select ...

More than 30% of Germany"s final energy consumption currently results from thermal energy for heating and cooling in the building sector. One possibility to achieve significant greenhouse gas emission savings in space heating and cooling is the application of aquifer thermal energy storage (ATES) systems. Hence, this study maps the spatial technical potential ...

The authors of the current paper are involved in assessing the viability of HT-ATES systems in Australia. The concept is to use renewable energy sources to generate water at > 150 ? C, and store it underground for less than a week (depending on supply and demand) before producing it back and generating electricity.The main differences between the proposed ...

Aquifer Thermal Energy Storage (ATES) systems use resident groundwater in a subsurface aquifer to store heat energy (Fleuchaus et al., 2018). The basic premise of ATES is: Water is produced from an aquifer; The thermal energy from some external source (e.g. excess renewable energy or industrial waste heat) is transferred to the water;

The concept of deep injection of hot water into sedimentary environments as noted above, was introduced in 2017 at a National Science Foundation (NSF) sponsored SedHeat meeting in Salt Lake City, Utah [12, 13].The concept was further considered at an NSF sponsored working group meeting in June 2017 in San Francisco, examining a Geothermal Battery ...