

# Aquifer energy storage cycle





## Overview

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This paper presents a Life Cycle Assessment (LCA) of a low-power capacity Aquifer Thermal Energy Storage (ATES) system supplying a building on Bordeaux INP's university campus, powered by the French low-carbon electricity mix.

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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: When needed, the hot water is produced, and the energy extracted. This process can be reversed to enable cooling. The duration.

pe of low temperature geothermal system. A particular type of open-loop system using aquifers for energy storage, is referred as aquifer thermal energy storage (ATES) systems. Aquifer thermal energy storage is an approach used to enhance the efficiency in comparison with other ground energy system.

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### **Aquifer thermal energy storage : A well doublet experiment at ...**

The two main objectives of this communication are to present a study of potential advantages and disadvantages of the doublet supply-injection well configuration in an aquifer thermal energy ...

### **A Review on Concepts, Applications, and Models of Aquifer**

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 ...



### [Design and flow Simulation of compressed Air Energy ...](#)

The groundwater aquifer is widely used in the geological storage of carbon dioxide and the medium of underground storage of natural gas, and it is proved that the aquifer can be ...

### **Modeling underground performance of compressed air energy storage ...**

Compressed air energy storage in aquifers (CAESA) is a novel large-scale energy storage technology. However, the permeability effects on



underground processes and ...



### Thermal Energy Storage in a Confined Aquifer: Second Cycle

During the first 6-month injection-storage-recovery cycle of the Auburn University Aquifer Thermal Energy Storage Project, water pumped from an upper supply aquifer was heated to an average ...



### A comprehensive review of geothermal energy storage: Methods ...

The significant potential of geothermal energy storage systems, particularly Underground Thermal Energy Storage (UTES), Aquifer Thermal Energy Storage (ATES), and ...



### Heat storage efficiency, ground surface uplift and thermo-hydro

High-temperature aquifer thermal energy storage (HT-ATES) systems can help in balancing energy demand and supply for better use of infrastructures and resources. The ...





### Groundwater Storage and the Water Cycle , U.S. Geological ...

In an aquifer, the soil and rock are saturated with water. If the aquifer is shallow enough and permeable enough to allow water to move through it at a rapid-enough rate, then ...



### Environmental impacts of aquifer thermal energy storage (ATES)

Aquifer Thermal Energy Storage (ATES) is an open-loop geothermal system allowing long-term storage of thermal energy in groundwater. It is a promising technology for ...

### Full cycle modeling of inter-seasonal compressed air energy storage ...

To study the operational characteristics of inter-seasonal compressed air storage in aquifers, a coupled wellbore-reservoir 3D model of the whole subs...



### Chapter 4 Aquifer Thermal Energy Storage

Fig. 4.5 Schematics of an Aquifer thermal energy storage (ATES) and layout of a well for charging and discharging (from AEE Institute for Sustainable Technologies 2006)



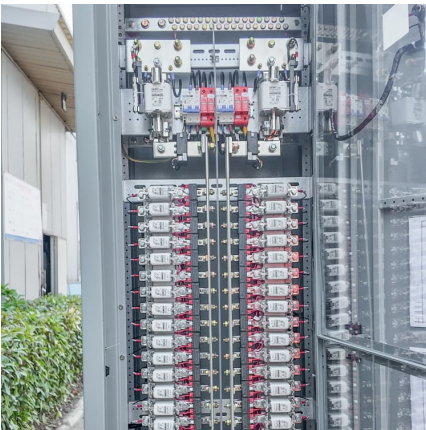
### A review of thermal energy storage technologies for seasonal loops

Highlights o Review of aquifer, borehole, tank, and pit seasonal thermal energy storage. o Identifies barriers to the development of each technology. o Advantages and ...



### [Prediction and Analysis of a Field Experiment on a ...](#)

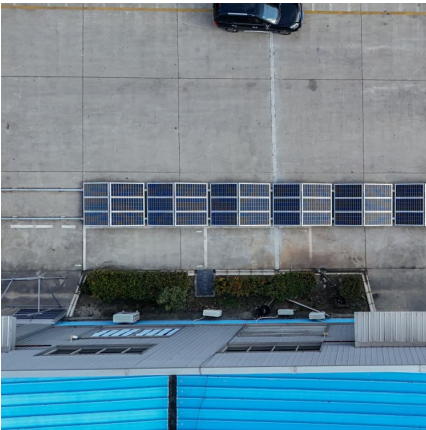
Earth Sciences Division, Lawrence Berkeley Laboratory, University of California, Berkeley The results of the first two cycles of the seasonal aquifer thermal energy storage field exper;.ment



### [Comparative Life-Cycle Assessment of Aquifer ...](#)

Due to the increasing need for sustainable energy and environmental quality in urban areas, the combination of aquifer thermal energy storage (ATES) and in ...





### [Aquifer Storage - Groundwater in Our Water Cycle](#)

Aquifer Storage Another important distinction between unconfined and confined aquifers is the way they respond when water is pumped from them. When water is pumped from a well in an ...

### **Thermal energy storage in a confined aquifer Second cycle**

Civil Engineering Department, Auburn University, Auburn, Alabama 36849 During the first 6-month injection-storage-recovery cycle of the Auburn University Aquifer Thermal Energy ...



### **Full cycle modeling of inter-seasonal compressed air energy storage ...**

o The feasibility of inter-seasonal compressed air energy storage in aquifers is firstly verified by numerical method. o Full cycle properties of inter-seasonal compressed air ...

### [Life Cycle Assessment of an Aquifer Thermal Energy ...](#)

To overpass the limits fixed by the aquifer properties, a solution to provide more energy to the building would be to increase the temperature difference between withdrawal and injected ...



### Recovery efficiency in high-temperature aquifer thermal energy storage

Aquifer Thermal Energy Storage (ATES) uses excess thermal energy to heat water which is stored in an aquifer until it is needed, at which time the hot water is recovered ...



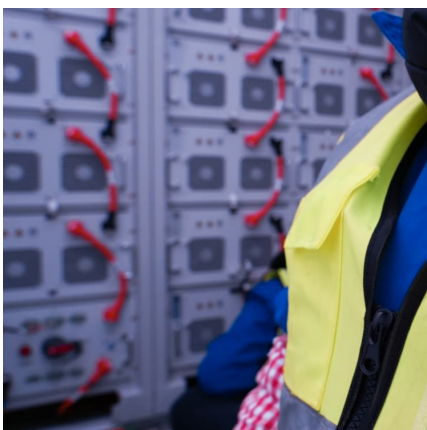
### [Life Cycle Assessment of an Aquifer Thermal Energy ...](#)

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### **Rapid growth of thermophilic bacteria during a high-temperature aquifer**

5 ???· Abstract High-temperature aquifer thermal energy storage (HT-ATES) of excess heat is an approach to balance seasonal differences in energy supply and demand while reducing ...



### **(PDF) University of Minnesota aquifer thermal energy storage ...**

The technical feasibility of high-temperature [ $>100^{\circ}\text{C}$  ( $>212^{\circ}\text{F}$ )] aquifer thermal energy storage (ATES) in a deep, confined aquifer was tested in a series of experimental cycles at the ...

### **A novel application of horizontal wells in aquifer thermal energy**

Aquifer thermal energy storage (ATES) systems are gaining popularity worldwide. ATES utilizes groundwater aquifers to store excessive heat and conserves energy. To maximize the ...



### **University of Minnesota aquifer thermal energy storage (ATES) ...**

The technical feasibility of high-temperature ( $>100$  {degrees}C ( $>212$  {degrees}F)) aquifer thermal energy storage (ATES) in a deep, confined aquifer was tested in a ...



### Microsoft Word

The experimental results show that after a complete cycle, the pressure change in the formation is small; as the cycle continues, the effective gas phase volume in the formation for the energy ...



### Numerical investigation of cycle performance in compressed air energy

The slight increase of energy recovery efficiencies from daily cycle to monthly cycle indicate that with the same energy storage scales, the energy produced by daily cycle ...

### Dimensionless Thermal Efficiency Analysis for Aquifer ...

Seasonal warm and cold water storage in groundwater aquifers is a cost-effective renewable energy technology for indoor heating and ...





[Life Cycle Assessment of an Aquifer Thermal Energy ...](#)

Life Cycle Assessment of an Aquifer Thermal Energy Storage System: Influence of design parameters and comparison with conventional systems Jérémy Godinaud, Philippe Loubet, ...

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