

# INTER-SEASONAL MEDIUM-TEMPERATURE ENERGY STORAGE



What is seasonal thermal energy storage (STES)? Seasonal Thermal Energy Storage (STES) takes this same concept of taking heat during times of surplus and storing it until demand increases but applied over a period of months as opposed to hours. Waste or excess heat generally produced in the summer when heating demand is low can be stored for periods of up to 6 months.



Why is seasonal energy storage important? These low-carbon energy sources also tend to abate during the fall and winter months. To accommodate the use of this variable energy throughout the year the grid may benefit from economically viable seasonal energy storage to shift energy from one season to another.



Can seasonal energy storage be economically viable? To accommodate the use of this variable energy throughout the year the grid may benefit from economically viable seasonal energy storage to shift energy from one season to another. Storage of this nature is expected to have output durations from 500 to 1000 hours or more.



What are the four methods of sensible heat storage? Four methods of sensible heat storage; Tank, pit, borehole, and aquifer thermal energy storage are at the time of writing at a more advanced stage of development when compared with other methods of thermal storage and are already being implemented within energy systems.



What are the different types of thermal energy storage systems? UTES can be divided into open and closed loop systems, with Tank Thermal Energy Storage (TTES), Pit Thermal Energy Storage (PTES), and Aquifer Thermal Energy Storage (ATES) classified as open loop systems, and Borehole Thermal Energy Storage (BTES) as closed loop.

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Are seasonal energy storage technologies limiting commercial deployment? This paper reviews selected seasonal energy storage technologies, outlines potential use cases for electric utilities, identifies the technical challenges that could limit successful commercial deployment, describes developer initiatives to address those challenges, and includes estimated timelines to reach commercial deployment.



Our results suggest that inter-seasonal energy storage can reduce curtailment of renewable energy, and overcapacity of intermittent renewable power. Importantly, grid scale energy storage assumes a critical role especially when the ???



This paper reviews cost structures and technical features of six technologies that could manage inter-seasonal power supply balance. It examines four potential storage options ???



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



The addition of inter-seasonal storage (ETES and hydrogen) helps reduce the size of the Li-ion batteries and increases the utilisation of the installed storage to some extent. ???

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Full cycle properties of inter-seasonal compressed air energy storage in aquifers are first revealed. The subsurface system of inter-seasonal compressed air energy storage in ???



Grid-integrated seasonal energy storage can reshape seasonal fluctuations of variable and uncertain power generation by reducing energy curtailment, replacing peak generation capacity, and providing transmission benefits.

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