GIS-based Aquifer Thermal Energy Storage (ATES) systems potential assessment in Spain

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Aquifer Thermal Energy Storage (ATES) is a technology that provides sustainable and cheap space heating and cooling. Its successful application is directly dependent on the presence of a suitable aquifer and local climatic conditions.

In Spain, there is not yet a mature market for ATES. There are no specific standards or norms and hardly any practical guidelines have been developed. This work presents a methodology that assesses the potential for ATES in Spain using subsurface and climatic data processed with GIS. The method identifies aquifers with possible thermal use and areas where the climatic conditions are favorable for ATES for the residential sector. Based on these conditions, urban areas located in favorable areas are identified. Their associated population allows making an approximation of the ATES market size in Spain. Results show that 38% of the aquifers in Spain show potential for ATES and 63% of large urban areas in Spain are located in such areas. Also, 50% of the population lives in areas where the residential sector appears to be suitable for ATES based on climatic conditions.