

Underground storage of latent heat: theory and experiments

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Abstract

Thermal heat storage in the subsurface can be in the form of latent heat. In this way heat can be stored in the form of ice, where heat is stored when ice melts, and heat is extracted by ice formation. We investigate the use of a bore-hole device for heat exchange with the subsurface. The main advantage in comparison with existing underground storage devices is the limited size of the required excavation. The device is equipped with extraction and recharge circuits arranged in two concentric helices connected at the bottom of the cylinder. The performance of the device is predicted with finite element COMSOL modelling and tested in the laboratory. Some key aspects are identified that will help optimizing the design and the usage of the system.