

Understanding the heat transfer across energy piles is the first step in designing these systems. The thermal process goes in an energy pile, as in a borehole heat exchanger, in different stages: heat transfer through the ground, conduction through pile concrete and heat exchanger pipes, and convection in the fluid and at the interface with the inner surface of the ...

3-D simulation of heat transfer rate in geothermal pile-foundation heat exchangers with spiral pipe configuration. *Appl. Therm. Eng.*, 87 (2015), pp. 655-668. ... Experimental study on the performance of phase change energy storage concrete for energy piles based on Gum Arabic and PEG-600. *Geothermics*, 114 (2023)

It is due to the preferable heat conduction properties of concrete and larger heat exchange surface of foundation structure that the energy pile has the better heat exchange efficiency than the traditional geothermal heat exchanger. Research results showed that the energy pile system could save more than 30% energy than air conditioning system.

Kavanaugh and Rafferty [25] calculated the thermal storage accumulated between piles and reflected the thermal interference effect. The variable  $T_p$  in Eqs. (2), (3) ... This study proposed a hybrid design algorithm for spiral coil energy piles that considers groundwater advection, and provided the best hybrid combination as well as the optimum ...

Spiral coil energy pile is a new type of ground heat exchanger (GHE) used in the ground coupled heat pump (GCHP) system. In this manuscript, a model experimental apparatus of energy pile with spiral coil was set up based on the similarity principle. ... At the same time, the higher the inlet temperature, the more the heat storage in the pile ...

Spiral shape GHE pipe is reported to have the highest thermal efficiency (Zhao et al., 2016). Furthermore, introducing higher thermal conductive additives to concrete, such as graphite, is capable of increasing its thermal conductivity (Li et al., 2018). ... Recently, energy storage piles utilizing phase change material (PCM) to enhance ...

The rapid population growth has accelerated the development of the building sector, propelling it to be the third-largest energy consumer after industry and transportation [1]. On the other hand, Heating, Ventilation, and Air Conditioning (HVAC) systems account for about 65% of the typical energy use of a building [2]. Moreover, building energy consumption is ...

On the thermal performance enhancement of spiral-coil energy piles with a thermal recovery system. Author links open overlay panel Reyhaneh Nazmabadi, Behrad Asgari, Ali Hakkaki-Fard. Show more. Add to Mendeley. ... It was observed that saturated soil could enhance the energy storage by about 20%, and a larger

pile, in terms of both height and ...

Soil thermal imbalance of ground source heat pump systems with spiral-coil energy pile groups under seepage conditions and various influential factors. Energy Convers. Manage. (2018) ... A tabulated sizing method for the early stage design of geothermal energy piles including thermal storage. Energy and Buildings, Volume 223, 2020, Article 110178.

Design of energy pile is to account for thermal stress and thermal energy storage when using numerical and analytical methods. In the thermal design simulation models of GHEs (ground heat exchangers) are necessary for sizing and energy calculations [24]. ... Spiral coil energy pile is a new type of ground heat exchanger (GHE) used in the ground ...

Other products ZHENGHAO-Manufacturer of Spiral pile. Welcome To Know Our Products, We Can Offer You High Quality Products! WhatsApp: +8613633278753 Email: info@cnzhnewenergy Home; ... Energy storage box The mobile energy storage container is designed as a frame structure, including the base of the container and the box body on the base.

Geothermal energy piles or ground heat exchange (GHE) systems embrace a sustainable source of energy that utilizes the geothermal energy naturally found inside the ground in order to heat and/or cool buildings. GHE is a highly innovative system that consists of energy loops within foundation elements (shallow foundations or piles) through which a heat carrier ...

Radiative cooling could produce a cold source  $\sim 8$  °C lower than the surroundings, which reduces the electricity consumption of the VCRS by  $\sim 21\%$ ; cold energy storage is used to shift the peak cooling load, and as a result, the electricity consumption and operation cost of the VCRS could be reduced by  $\sim 12\%$  and  $\sim 32\%$ , respectively; frosting ...

Yang et al. [11] extensively studied phase change energy piles (The phase change material is encapsulated and introduced into the energy pile as a way to reduce temperature variation and improve heat exchange efficiency.) based on the summer model to harness renewable energy potential [12]. They found that longer operation times resulted in ...

Spiral pitch is one of the most important parameters affecting the thermal performance of spiral-shaped energy piles (Zarrella et al., 2013). Yang et al. (2016) conducted an experimental study to determine the impact of spiral coil parameters on the thermal performance of an energy pile. ... Energy storage technologies will play a crucial role ...

The parameters of spiral-coil energy pile groups, including pile layout, pile spacing, pile depth, and groundwater flow, have great influences on the soil heat transfer and the system operating performance. ... Performance evaluation before and after solar seasonal storage coupled with ground source heat pump. Energy Convers Manage, 103 (2015 ...

# Spiral pile energy storage

As the process of solar energy storage continues, the pile-pile thermal interference occurs, resulting in that the temperature at the center of the pile group gradually increases. ... Soil thermal imbalance of ground source heat pump systems with spiral-coil energy pile groups under seepage conditions and various influential factors. Energy ...

Energy piles with GHEs encased in a pile foundation have been evaluated as the most effective method to reduce the initial construction cost of heating, especially the drilling cost [50]. These energy pile structures can also be used to support the superstructure load while meeting the building energy demand [51, 52].

Energy pile is a deep foundation that combines two functions, transferring structural loads to the soil and serving buildings thermal needs. It is an innov ... "3-D simulation of heat transfer rate in geothermal pile-foundation heat exchangers with spiral pipe configuration," Appl. Therm. Eng., 87, 655-668 (2015).  
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Integrating energy storage devices into the GSHP system helps alleviate temperature fluctuations during thermal imbalances, thereby boosting the operational efficiency of the system. ... the members of the research team optimized the structure of the spiral-buried pipe and proposed a new type of truncated spiral energy pile [26], and two ...

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