

Smart ground-source borehole heat exchanger backfills: A numerical study

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Abstract

Geothermal heat pump borehole heat exchangers rely on sensible heat for energy storage and low thermal conductivity materials for heat transfer. This paper examines numerically the potential benefits of an engineered backfill on the performance of a borehole heat exchanger. The results show that improving the thermal conductivity of the backfill and introducing a phase change material for energy storage can alter the thermal radius of influence of the borehole, improve the system efficiency, and reduce long-term changes in ground temperature.