

DIRECT-EVAPORATION GROUND-COUPLED HEAT PUMPS**Hermann Halozan, René Rieberer**

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ABSTRACT

Ground-coupled heat pumps gain importance world-wide with respect to energy efficiency in heating and cooling operation. The ground acting as a storage offers the possibility of damping the effects of the outside air temperature fluctuations, in colder climates it enables monovalent operation of the heat pump, and for utilities it is a tool for demand side management measures.

In Austria, direct-evaporation ground-coupled systems with horizontally installed ground coils are dominating the market. Reasons are lower costs and higher efficiencies due to omitting the circulation pump and one heat transfer loss compared with secondary loop systems; the SPF of these systems is in the range of 3.8 to 5. In the case of limited ground area or existing houses, the alternative are vertical systems, again direct evaporation systems. A new concept is a heat pipe as ground heat exchanger, and due to the fact that in this heat pipe only CO₂ without oil is self circulating, no environmental concerns exist. The SPF achievable with such systems is similar to that of direct-evaporation systems.

But besides new buildings one has also to consider the building stock, and retrofitting this building stock will become the heat pump market of the future. New developments like improved heat pump units, advanced direct evaporation heat pumps and heat pipe based vertical probes show that there is still room for new ideas, which may be necessary for being successful in the future.