



## **Cold plumes of ground source heat pumps: Their length and legal situation**

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In the available work the results from simulations of temperature anomalies in the subsurface are discussed against the background of their legal situation. The length of the temperature anomalies and their influence on adjacent ground source heat pumps (GSHP) is simulated. The number of shallow geothermal installations in Germany increased to more than 44,000 in 2006. It has more than doubled from 2005 to 2006. The use of GSHPs leads to temperature anomalies (cold plumes) in the subsurface. In spite of their rising numbers there is no consistent approval procedure. Currently the regulations are geared to the existing legal guidelines of the water resources act and the federal mining law.

To promote geothermal energy as a non-polluting energy source the important questions about legal situation, ecological influence on subsurface and economic influence on adjacent installations have to be answered. Particular attention should be paid to the minimum distances between GSHPs. In German guidelines and regulations in Austria and Switzerland the minimum distances vary between 3 m (Saarland, Germany) and 10 m (Baden-Württemberg, Germany) or 0.5 m per 10 m drilling depth (Tirol, Austria) respectively. First modelling results show that groundwater flow velocity and energy output have the greatest impact on plume length. With faster flow velocities more heat is supplied and the cold plumes become smaller. The principle of "heat recharge" is valid for both unconsolidated and consolidated media. Nevertheless, it is also shown that 10 m as minimum distance is not adequate for all subsurface conditions. Hence, specific local assessments are still necessary.