

Deep drilling for geothermal energy in Finland

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There is a societal request to find renewable CO₂-free energy resources. One of the biggest such resources is provided by geothermal energy. In addition to shallow ground heat already extensively used in Finland, deep geothermal energy provides an alternative so far not exploited. Temperatures are high at depth, but the challenge is, how to mine the heat? In this presentation, the geological and geophysical conditions for deep geothermal energy production in Finland and Sweden are discussed as well as challenges for drilling and conditions at depth for geothermal energy production. Finland is located on ancient bedrock with much lower temperatures than geologically younger volcanically and tectonically active areas. In order to reach sufficiently high temperatures drilling to depths of several kilometres are needed. Further, mining of the heat with, e.g., the principle of Enhanced Geothermal System (EGS) requires high hydraulic conductivity for efficient circulation of fluid in natural or artificial fractures of the rock. There are many issues that must be solved and/or improved: Drilling technology, the EGS concept, rock stress and hydraulic fracturing, scale formation, induced seismicity and ground movements, possible microbial activity, etc. An industry-funded pilot project currently in progress in southern Finland is shortly introduced.