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GEOTHERMAL HEAT SUPPLY BY HOT DRY ROCK TECHNOLOGY

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Overview

Recently both, politics and industry recognize the big geothermal heat potential of hot deep crusted rocks as a possible future energy option even for countries in Central Europe such as Germany without natural hydrothermal resources generally found at plate boundaries. The advantage of geothermal energy is that it can be used for base load supply, just opposite to wind energy. However, two major restraints exist for a large-scale use of deep geothermal energy. First, the extraction of heat requires the stimulation of an underground heat exchanger where injected cold water is heated before it is recovered from a production well. This problem was finally successfully solved within the European HDR-Soultz project in the granite basement rock of the Upper Rhine area in France at the end of nineties. Both, economics and environmental concerns demand the use of excess low enthalpy energy for heating which presumes the existence or the installation of heat distribution systems.

The paper will present the status of the geothermal energy use and its potential for future energy supply and will discuss the technical and economical constraints using geothermal heat on the example of a project.

Methods

The so called PROMETHEUS project in Germany, intends to transfer the HDR technology developed in the European Soultz project from granites rocks setting to a more general geological situation and to concentrate on the use of geothermal energy by a big heat consumer existing at the Ruhr-University Bochum and the university quarter with a heat base load demand of nearly 10 MW to supply about 50 000 people. This milestone project consists of three stages. First a feasibility study, which is completed. The second step is into preparation. It is an underground exploration phase to identify the geological/geothermal conditions at 4 km depth. The last step will be the realization phase including the stimulation of the underground heat exchanger and integration of the two-well circulation system into the existing local heat supply and distribution system.

Results

The results show that it is possible to use the deep geothermal heat from technical and economical point of view. A share of 20 % of the total annual heat demand could be covered and at last 16 % reduction of greenhouse gases could realised.

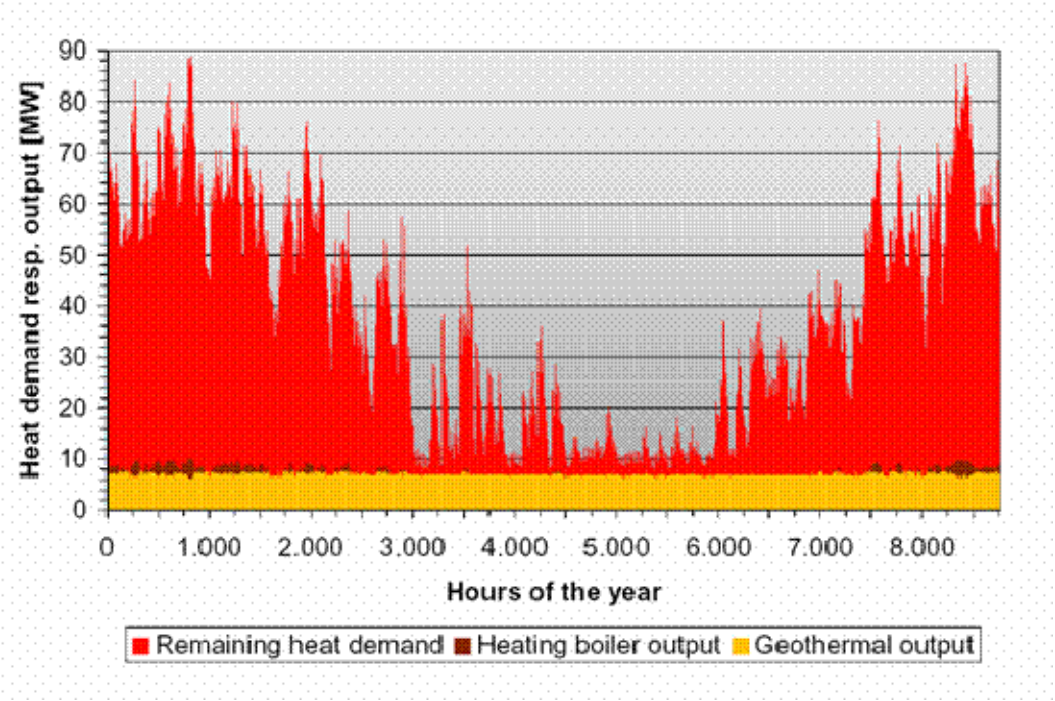

Fig. 1: Structure of heat supply at the location Bochum by using deep geothermal energy

Conclusions

Geothermal energy has the potential to come into the future heat and electricity market. Heat pumps for heating houses are state of the art; some pilot projects to win deep heat from aquifers are in process. This presentation is dealing with the potential and restrictions of using deep crusted rocks: there is a big potential for future energy economy.

References

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