



## Ground Source Heating and Cooling -Elements in a Sustainable Energy Supply

Claus Ditlefsen<sup>1</sup>, Ingelise Møller<sup>1</sup>, Inga Sørensen<sup>2</sup>, Henrik Bjørn<sup>2</sup>, Anker Lajer Højberg<sup>1</sup> & Thomas Vangkilde-Pedersen<sup>1</sup>, <sup>1</sup> Geological Survey of Denmark and Greenland & <sup>2</sup> VIA University College, Denmark

### ABSTRACT

Shallow geothermal energy is a renewable energy source, where the low enthalpy heat in the shallow subsurface can be exploited using borehole heat exchangers in a combination with heat pumps. Despite the energy saving and CO<sub>2</sub> emission reduction potential of the technology, the utilisation of shallow geothermal energy in Denmark is relatively limited compared to e.g. Sweden and Germany. Today, the total number of ground source heat pumps in Denmark is around 27,000, currently increasing by 5,000 per year. By far, most of the existing installations are horizontal closed loop systems, while four to five hundred are borehole heat exchangers, (Mahler et al. 2013).

In contrast to our neighbouring countries, the main part of Denmark is situated in a sedimentary basin dominated by soft sediments and variable depth to the water table. Until now only few investigations of the thermal properties of Danish sediments have been carried out, but preliminary results indicate that the energy extraction may be up to 40% lower for unfavourable geological scenarios compared to more favourable geological conditions, (Vangkilde-Pedersen et al. 2012). The 3-year project "GeoEnergy" supported by the EUDP program of Danish Energy Agency aims at paving the way for a better understanding of the geological and environmental aspects of heat extraction from shallow geological layers thereby enhancing and optimising the possibilities for using borehole heat exchangers, (Ditlefsen et al. 2013). The purpose is to develop tools and best practice for the design and installation of systems under typical Danish conditions. Results and recommendations from the project will be presented and discussed.

### REFERENCES

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