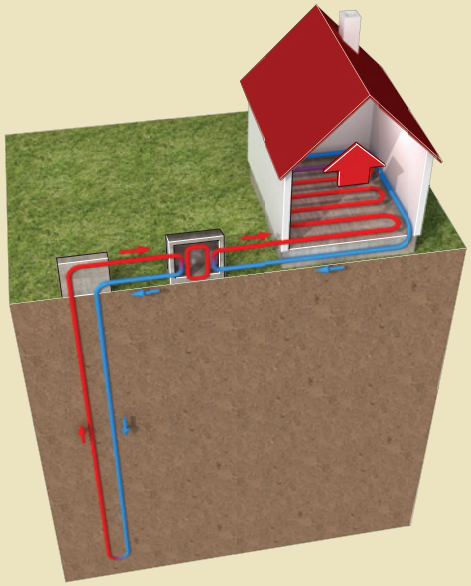
GEOENERGY

Closed-loop boreholes – knowledge, tools and best practice



Heat-pump systems based on closed-loop, geothermal boreholes, has a potential for CO_2 reduction and energy efficiency. The application in Denmark, however, is limited compared to our neighbouring countries and we still lack know-how and experience. The objective of the project 'GeoEnergy, Tools for ground-source heating and cooling based on closed-loop boreholes' is to pave the way for a wider use of the technology by acquiring know-how and developing tools and best practice for the design and installation of plants as well as providing training and dissemination.

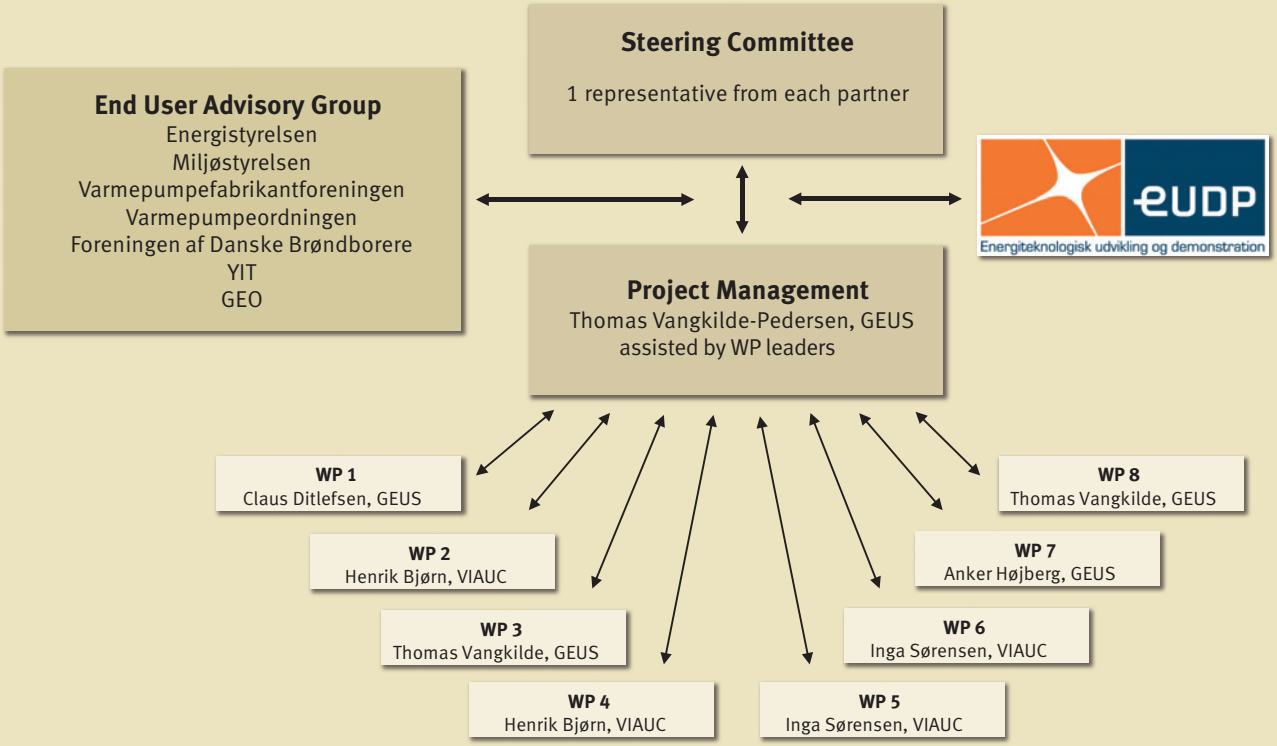
The main activities of the project are:

- Collection and analysis of existing information and experience as well as identification of key parameters for planning, design and installation of heat-pump systems based on closed-loop boreholes.
- A comprehensive mapping and measuring programme for surface temperatures, temperature gradients and thermal properties of different soil types and materials.
- Optimisation of system design with respect to environment and economy based on experience from existing installations and a new test site. The analyses will include drilling work and completion of boreholes, system control and automation, calculation of energy balance, energy storage (heating and cooling) and modelling of heat and fluid flow.
- Construction of a database with existing information and results of the measuring and mapping programme.
- Dissemination activities including a public web-based database, material for training and education, workshops and seminars, technical guidelines and recommendations for legal framework.

GEOENERGY Work package structure

WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	WP 7	WP 8
Database and dissemination	**Equipment and measurements**	**Temperature gradients and surface temperatures**	**Drilling methods and grout techniques**	**System design and energy balance**	**Training and education**	**Interaction with ambient groundwater system**	**Guidelines and final dissemination**
GEUS	**VIAUC**	**GEUS**	**VIAUC**	**VIAUC**	**VIAUC**	**GEUS**	**GEUS**
Task 1.1 Identification of parameters and knowledge	Task 2.1 Identification and test of equipment	Task 3.1 Desk study on temperature gradients and surface temperatures	Task 4.1 Collection of existing knowledge	Task 5.1 Analysis of design scenarios	Task 6.1 Planning of training courses	Task 7.1 Selection of model code	Task 8.1 Synthesis of results from WP4, WP5 and WP7
Task 1.2 Compilation of shallow geology	Task 2.2 Thermal properties of soil samples	Task 3.2 Supplementary measurements of temperature gradients	Task 4.2 Test of drilling and grout techniques	Task 5.2 Operation of test site	Task 6.2 Conduction of training courses	Task 7.2 Heat and fluid flow modelling	Task 8.2 Synergy/conflicts with other areas
Task 1.3 Design and construction of database	Task 2.3 Thermal properties of materials		Task 4.3 Recommendations for drilling and grouting	Task 5.3 Guidelines for system design	Task 6.3 Other dissemination activities	Task 7.3 Effects of temperature changes in groundwater	Task 8.3 Project management and administration
Task 1.4 Concept for geo-reports	Task 2.4 Guidelines for equipment and measurements					Task 7.4 Effects of fluid leakage	Task 8.4 Final project dissemination

GEOENERGY Project organisation



Project period and financing

The project period is 1 March 2011 to 28 February 2014 and the project is financed by the partners (50%) and the EUDP programme of the Danish Energy Agency (50%).

Keywords

Closed-loop boreholes; ground-source heat pumps; tools; best practice; thermal properties; geology; system design; energy balance; education; dissemination.

Project partners

De Nationale Geologiske Undersøgelser for Danmark og Grønland
VIA University College, Horsens
Geologisk Institut, Aarhus Universitet
Den Jydske Håndværkerskole
Dansk Miljø- & Energistyring A/S
GeoDrilling A/S
Brædstrup Fjernvarme AMBA
DONG Energy Power A/S
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