

**GROUDWATER MODELLING FOR
HEAT STORAGE PROJECT
MANAGEMENT****Context and objectives**

District heating provides a rational system to heat buildings and generate domestic hot water in urban areas. A key challenge in this optimisation is to align heat production and demand. When using renewable source, as for example the heat surplus from industry or waste incineration, heat is produced all-year long while the demand is high only during the heating season. **Heat Storage** is thus a key requirement to optimise energy use.

A possibility is to inject heat in aquifers when surplus is available and recover it during the heating season. In order to design such operations, thermo-hydraulic parameters of hydrogeological reservoirs are required that are not obtained from standard well test procedures.

A successful **Heat Storage** installation requires particular underground conditions to be feasible. Thus the application is limited to the presence of a high conductivity aquifer.

Research approach and methodology

In this project, a review of possible test configurations in special situation of single well test that is relevant in heat storage project and a range of numerical simulations will be carried out to investigate the heat capacity of the aquifer for seasonal storage.

The student will develop a detailed research strategy. He will develop different operational scenarios that investigate if and how hot water can be stored and produced without significant losses, followed by numerical analysis options within a hydrogeological situation. Simulations will be based on hydrogeophysical measurement at the Concise (VD) region considering fractured/karstified media flow with conductive and advective heat transfer. This approach will then be used to perform a sensitivity study, while investigating different physical phenomena and their impact on system efficiency.

Partners and collaboration

The project will be supervised by Dr. R. Sohrabi (UniNE) and Prof. Dr. B. Valley (UniNE). It will be carried out in collaboration with the University of Geneva (UniGE), the SIG (Industrial Services of Geneva) and the ETH Zurich. The project is part of the European GEOTHERMICA project (HORIZON 2020) which include many partner countries that will enable the student to come into contact with members of other research facilities and participate in scientific conferences.

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