



HAL
open science

Water concerns in UTES: what can be learnt from geothermal experience & what issues need to be specifically addressed?

Annick Loschetter, Maud Watkinson, Simona Regenspurg, Setareh Rad, Laurent André, Arnault Lassin, Guido Blöcher, Sylvain Stephant, Niels Hartog, Martin van der Schans, et al.

► **To cite this version:**

Annick Loschetter, Maud Watkinson, Simona Regenspurg, Setareh Rad, Laurent André, et al.. Water concerns in UTES: what can be learnt from geothermal experience & what issues need to be specifically addressed?. EGU 2024, EGU General Assembly, Apr 2024, Wien, France. hal-04460163

HAL Id: hal-04460163

<https://hal.science/hal-04460163>

Submitted on 20 Feb 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

EGU24-10957

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



Water concerns in UTES: what can be learnt from geothermal experience & what issues need to be specifically addressed?

Annick Loschetter¹, Maud Watkinson¹, Simona Regenspurg², Setareh Rad¹, Laurent André^{1,5}, Arnault Lassin¹, Guido Blöcher², Sylvain Stéphant¹, Niels Hartog³, Martin van der Schans³, and Philip J. Vardon⁴

¹BRGM, France (a.loschetter@brgm.fr)

²GFZ, Germany

³KWR, Netherlands

⁴Delft University of Technology, Netherlands

⁵ISTO, France

The European project PUSH-IT's ambition is to overcome the seasonal mismatch between heat demand and heat generation from sustainable sources using Underground Thermal Energy Storage (UTES) at high temperatures, i.e. up to 90°C (<https://www.push-it-thermalstorage.eu>). PUSH-IT showcases three UTES technologies at six pilot sites: Aquifer Thermal Energy Storage (ATES) in the Netherlands and Germany, Mine Thermal Energy Storage (MTES) in Germany and the UK, and Borehole Thermal Energy Storage (BTES) in Germany and the Czech Republic.

Water quality issues represent technical challenges for viable long-term thermal energy storage, whatever the technology. These include:

- Biogeochemical perturbations in the storage reservoir: the temperature gradient influences the chemical composition of the fluids that may lead to (bio)clogging in near-wells and loss of injectivity/productivity, notably for ATES;
- Corrosion and scaling in the wells and facilities;
- Shallower aquifer perturbation by temperature increase and saline brines from deeper aquifers.

The lessons learnt over decades of geothermal exploitation and low temperature thermal energy storage provide a solid basis for anticipating, monitoring, managing and remediating these issues in a variety of geological contexts. However, for increasing the temperatures of thermal energy storage in geothermal reservoirs several specificities have not been thoroughly investigated, such as the thermal storage at high temperature, the need to use reversible wells, reversible fluxes in the reservoir, temperature and pressure cycling. Furthermore, the role of microbiology has often been neglected and is anticipated to be more sensitive in storage applications.

At the current stage of the project, the main concerns for each site have been mapped. The modelling and monitoring works are at different stages of progress depending on the sites.

Significant methodological work is being carried out on microbiological phenomena and on the elaboration of monitoring protocols.

The project will go beyond the simple feedback on the experience from pilot sites by providing recommendations to anticipate and deal with water quality issues for future sites. We will provide guidelines to assist decision-makers in identifying the main issues, in implementing the necessary modelling, in sizing and adjusting the monitoring plan, in assessing possible water treatment benefit vs. environmental impact. Anticipating and managing water-related issues as far as possible is the best way of making the right choices, guaranteeing the performance and longevity of operations, limiting environmental impact and encouraging society engagement and support.

Acknowledgements: Funded by the European Union under grant agreement 1011096566 (PUSH-IT project). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor CINEA can be held responsible for them.