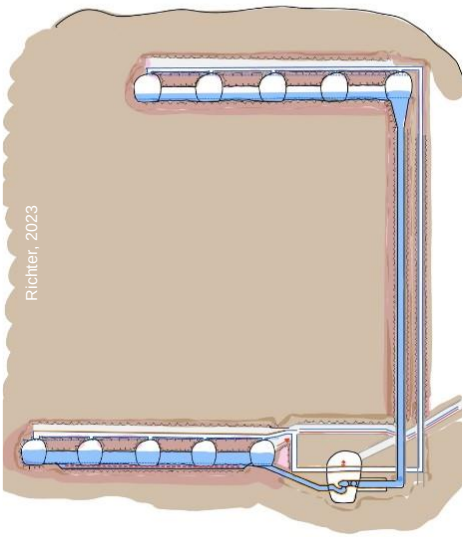

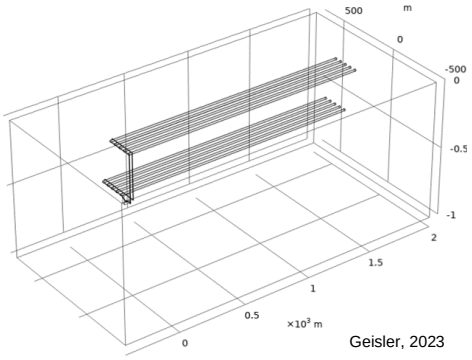

Geisler, 2023

FACT SHEET for the research project Thermal underground-PSP

SHORT TITLE / ACRONYM

Therm. U-PSP

LONG TITLE

Underground pumped-storage hydropower power plant with seasonal thermal energy storage

DESCRIPTION

The "Thermal U-PSP" project, conducted in 2023, investigated a concept for a pumped storage power plant for storing electricity and heat. This involved collaboration between the Graz University of Technology, particularly the Institute of Hydraulic Engineering and Water Resources Management, and the Institute of Rock Mechanics and Tunnelling, as well as the engineering firm AFRY. The concept study of TU Graz included a detailed technical concept, with comprehensive 10-year transient multiphase thermal simulations to store heat in the rock itself. The main data and key figures of the project were described, a rough cost estimate was conducted by partner AFRY, and major risks were identified. Furthermore, recommendations were made to minimize the risks and ensure the project's successful implementation.
A large electrical and thermal storage capacity was planned for a potential site in a metropolitan area. The developed system is flexibly adaptable and expandable. The plant is intended to be built mostly underground, which increases public acceptance and the feasibility of obtaining permits. By combining pump, electrical, and thermal storage, a high overall efficiency can be achieved. The planned installed capacity is 340 MW, with an electrical storage capacity of 2.7 GWh. Seasonal heat storage of 253 GWh is also planned.

The findings from the project support the further development of pumped storage power plants and their integration into the energy infrastructure, which is crucial for achieving energy and climate goals.

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