Innosuisse – Schweizerische Agentur für Innovationsförderung



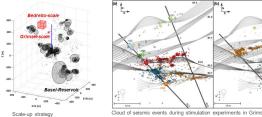
# Pilot & demonstration projects in geoenergy and hydro power The SCCER-SoE team; for more information: gianfranco.guidati@sccer-soe.ethz.ch

#### Motivation

A large emphasize was put onto Pilot & Demonstration projects, both in the field of geoenergy and hydro power. Some of them could not be executed as planned, others had to be adapted, but the rest delivered results as expected.

## Enhanced geothermal systems

Extracting thermal energy from the crystalline baserock offers numerous and ubiquitous opportunities from district heating to electricity production. However, permeability required to circulate a heat transfer fluid has to be created artificially, while avoiding seismic events that can be perceived at the surface. First experiments in the Grimsel lab demonstrated that such permeability enhancement by up to 3 order of magnitude can be achieved by controlled injection of water into the rock volume. Currently, the experiment is scaled up in the Bedretto underground lab (www.bedrettolab.ethz.ch/home/).

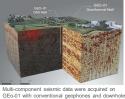




#### Heat production and storage

Exploration approaches, concepts and models are developed and applied in the Geneva Basin to demonstrate direct heat production and subsurface storage potential in sedimentary basins at shallow to medium depths. Two wells have been successfully drilled to 744 and 1456 m depth. Testing will continue for a long period of time in order to assess well deliverability and reservoir connectivity. andrea.moscariello@unige.ch

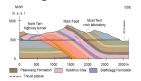


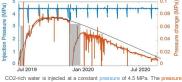




Geological CO<sub>2</sub> storage

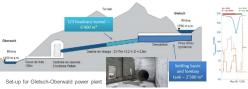
Underground storage of CO<sub>2</sub> requires a reservoir with sufficient porosity and permeability and a tight caprock. The risk that CO<sub>2</sub> migrates through faults in this caprock was studied in the Mont Terri Laboratory by injecting CO<sub>2</sub>-rich water into a fault in the Opalinus clay. Preliminary results indicate that the migration of CO<sub>2</sub> is rapidly reducing after the injection, suggesting a selfhealing mechanism of the fault. alba.zappone@sed.ethz.ch

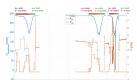




## Small flexible hydro power

Existing elements (settling basin, headrace tunnel) were used as storage tanks to improve flexibility of the Gletsch-Oberwald runof-river hydropower plant with the aim to increase production and revenue. The concept was successfully demonstrated in two test campaigns. This allowed to provide the plant owner with head and storage limits for a flexible operation. The driving procedures and safety measures must be further addressed before using the powerplant in this flexible mode. cecile.muench@hevs.ch





#### Large flexible hydro power

Hydropower projects face new issues linked with operation flexibility and sediment management, impacting their intraday/annual competitive profile. The FLEXSTOR projects addressed these issues in a systematic way. The topic of flexibility will be carried on at European scale with XFLEX Hydro with six demonstrators in Switzerland, Portugal and France. Francois.Avellan@epfl.ch









































