PERF◆RM

Public summary of the GEOTHERMICA PERFORM project

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Despite years of experience with geothermal systems, the geothermal sector still faces a significant number of underperforming doublets, posing a strong limitation on a region's growth of geothermal energy utilization. A key operational challenge in geothermal energy production is restricted flow. Major obstacles for geothermal flow are scaling (mineral deposition), clogging (solid micro-particle deposition), corrosion and inefficient injection strategies. These issues result in high and mostly unforeseen costs for workovers, and additionally reduce production. In order to overcome these challenges, the consolidation and sharing of knowledge, including validated strategies for prevention and mitigation needs to be in place.

The overarching target of PERFORM was to improve geothermal system performance, lower operational expenses and extend the life-time of infrastructure by the concept of combining data collection, predictive modelling, innovative technology development and in-situ validation.

Within PERFORM a comprehensive knowledge database has been established, predictive models have been built and new and improved, cost-effective technologies have been demonstrated to reduce or even eliminate flow-obstructive scaling, clogging, and resistance to fluid (re-)injection. The new developed technologies comprise the use of specific adsorption materials (cation filters e.g. zeolite, chitosan) to remove Pb^{2+} and Cu^{2+} from solution and the H_2S removal by flocculation. On top of that the consortium developed a best practice guide and an interactive web-based tool. With this tool, the geothermal operator can plan future operations, see which mitigation measures can reduce their challenges and optimize production/injection. The web tool is designed in such a way to guarantee a maximum and an economical energy production. The reports, web tool and best practices are available on the project website: www.geothermperform.eu

In the table below some examples of the challenges and suggested solutions have been listed.

Challenges	Suggested solutions
Calcite scaling	Limit CO_2 outgassing by maintaining a high enough top side pressure with sufficient CO_2 remaining in solution.
Heavy metal scaling	Use element specific adsorption materials (cation filters e.g. zeolite, chitosan) to remove heavy metals from solution.
H_2S induced corrosion	Remove H_2S by reaction with added iron-based substances and removal of the particles by filtering.
Galvanic corrosion	▪ Use high-alloyed materials for devices in contact with the geothermal fluid. ▪ Use element specific adsorption materials (cation filters e.g. zeolite, chitosan) to remove Pb^{2+} and Cu^{2+} from solution.