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Injection of geothermal gases at the Kızıldere field: A pre-injection overview

Taylan Akın^{1,2}, Selçuk Erol², Serhat Akın², Erdinç Şentürk³, and Raziye Şengün Çetin³

¹Geothermal Application and Research Center, Pamukkale University, Denizli, Turkey (takin@pau.edu.tr)

²Department of Petroleum and Natural Gas Engineering, METU, Ankara, Turkey

³Zorlu Energy, Turkey

Emissions of greenhouse gases such as CO₂ emitted at Turkish geothermal power plants are an obstacle to accepting geothermal energy as green power. However, recent advances in carbon capture and storage technologies have enabled low emissions by re-injecting produced CO₂. Carbfix is one of the recent projects where geothermal gases are re-injected into the reservoir. In the Carbfix project, waste gases from Hellisheidi Power Plant are dissolved in effluent water and gas-charged fluid is injected into the basaltic subsurface where some portion of the gases precipitate as minerals. To understand whether the Carbfix methodology can be a standard application for the geothermal industry worldwide, an international research project called Geothermal Emission Control (GECO) was started in 2018. GECO is funded by the EU through the H2020, and the project consortium is consisting of 18 partners from 9 countries across Europe.

GECO aims to develop near-zero-emission geothermal power plants in four sites by providing clean geothermal energy at a lower cost. Kızıldere (Turkey) geothermal field (KGF) is one of the demonstration sites in the project where emission gases are injected into Menderes Metamorphic units. Zorlu Energy and METU are partners of the project from Turkey, and they operate the demonstration and monitoring of CO₂ injection in KGF. We present here a geological overview of the Kızıldere injection site, baseline monitoring studies, fluid chemistry of the reservoir, and the predicted chemistry of the gas-charged fluid at the site. Moreover, geochemical simulation conducted for predicting fluid-rock interaction taking place in the geological formation is being assessed.

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