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In-situ carbonatization of CO2 - The Carbfix project in Iceland

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Among commonly proposed CO2 storage techniques, the injection of anthropogenic CO2 into deep geological formations is quite promising due their large potential storage capacity. Finding a storage solution that is long lasting, thermodynamically stable and environmentally benign would be ideal. In-situ mineralization and storage of carbon dioxide as solid carbonate in basaltic rocks may provide such an ideal solution. In nature, the carbonatization of basaltic rocks occurs in a variety of well-documented settings, e.g. geothermal and deep ocean vent systems. In order to assess the feasibility of in-situ CO2 mineralization in basaltic rocks, a field-scale project, CarbFix, is scheduled to inject CO2 in spring of 2009 at Hellisheidi, Iceland (www.carbfix.com). The injection site is adjacent to a new geothermal power plant, which will supply up to 30,000 tons of CO2 per year for injection into subsurface basalts at a depth of 400–700 m and a temperature of ca. 30°C. The Hellisheidi site was chosen for several reasons, including a local source of CO2, the availability of several strategically located wells for monitoring the chemical evolution of the groundwater, and the proximity to infrastructure through Reykjavik Energy, a CarbFix partner. CO2 will be injected at a partial pressure of 25 bars and will be dissolved in water during injection. Model simulations, natural analogues and experimental work suggest that the CO2 charged waters will reacts with the basalt and form carbonate minerals. Results of this project will thus be used to optimize the in-situ carbonatization process of CO2.