

The CarbFix-SulFix project: Mineral storage of CO₂/H₂S gas mixtures in basaltic rocks

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The overall cost of carbon capture and storage is dominated by that of capture and gas separation. This capture cost could be lowered by injecting gas mixtures into rocks as is now being tested at the CarbFix-SulFix site in SW-Iceland. There, a gas mixture of 70% CO₂ and 30% H₂S is dissolved in water from the Hellisheidi geothermal power plant and injected into the basaltic rocks. The initial CarbFix and SulFix projects demonstrated solubility storage of the pure separate gases in a few minutes [1] [2] and that more than 80% of the injected CO₂ into basaltic rocks was mineralised within a year from its injection at 20–50°C [3].

During the first phase of the CarbFix-SulFix project, approximately 5000 tonnes of CO₂ and 3500 tonnes of H₂S annually will be dissolved in condensation water, mixed with waste water and injected to 750 m depth into the high temperature reservoir at 200–270°C. The gas mixture injection began on 3 June 2014, while tracer tests started three weeks later. By the end of the year 2014, 2400 tonnes of CO₂ and 1300 tonnes of H₂S had been injected.

Water and gas samples were collected from four monitoring wells. There is a minor increase in CO₂ (total dissolved carbon) and H₂S (total dissolved sulphite), while the majority of major elements are relatively stable. Preliminary data from monitoring wells therefore suggests that some of the injected gas mixture is already stored as minerals in the basaltic reservoir.

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[1] Sigfusson *et al.* (2015) *Int. J. of Greenh. Gas Control* **37**, 213–219. [2] Gunnarsson *et al.* (2013) *GRC Transactions* **37**, 785–789. [3] Matter *et al.* (2014) *Energy Procedia* **63**, 4180–4185.