

Injection of geothermal CO₂ and H₂S gases at the Nesjavellir site: A pre-injection overview

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Injection of CO₂ and H₂S waste gases emitted from the Hellisheidi Power Plant through their dissolution in water has been ongoing since 2014. The gas-charged fluid is injected into the basaltic subsurface where the gases precipitate as minerals for safe and long-term storage. The method has been developed within the CarbFix project and demonstrated its efficiency in the rapid mineralization of these gases at Hellisheidi, SW-Iceland.

Plans are to start injection of CO₂ and H₂S emitted from the Nesjavellir Power Plant, a plant that is located about 10 km north of the Hellisheidi Power Plant, but both plants utilise the geothermal system of the Hengill volcano. Preparation of a pilot injection of ~1000 tonnes of a 65%CO₂-35%H₂S gas mixture is in preparation as a part of the EU-funded GECO project.

Building upon previous studies and experience gained through the CarbFix injections at Hellisheidi [e.g. 1, 2, 3] we present here a geological overview of the Nesjavellir injection site, fluid chemistry at the site and the predicted chemistry of the injected fluid. The water-CO₂-H₂S basalt interaction taking place in the geological formation is then assessed through geochemical simulations to predict the fate of the injected gases in the subsurface.

[1] Gunnarsson, et al., 2018. The rapid and cost-effective capture and subsurface mineral storage of carbon and sulfur at the CarbFix2 site. *International Journal of Greenhouse Gas Control*, 79: 117-126.

[2] Matter, J.M., et al., 2016. Rapid carbon mineralization for permanent and safe disposal of anthropogenic carbon dioxide emissions. *Science* 352, 1312-1314.

[3] Snæbjörnsdóttir, S.Ó., et al. 2017. The chemistry and saturation states of subsurface fluids during the in situ mineralisation of CO₂ and H₂S at the CarbFix site in SW-Iceland. *International Journal of Greenhouse Gas Control*, 58: 87-102.