**Carbfix Project Information**

**Project Developer Website**

Carbfix www.carbfix.com

**Project Location**

Iceland

**Project Type**

CO2 Storage

**Project Description**

The Carbfix team has developed a secure, cost effective and environmentally benign process and technology for permanent CO2 mineral storage in the subsurface. Carbfix accelerates natural processes in which CO2 dissolved in water is fixed as stable carbonates underground. Carbfix started out as an academic project back in 2006 and was formalized by four founding partners in 2007, Reykjavík Energy, the University of Iceland, CNRS in Toulouse and the Earth Institute at Columbia University. The team has published over 100 scientific papers and applied for patents for key aspect of the technology. Several universities and research institutes have participated in EU funded projects, Carbfix, Carbfix2, GECO and S4CE. Carbfix was established as a company, an independent subsidiary of Reykjavík Energy, in 2019.

Pilot injections were carried out in 2011-2012 at the Carbfix pilot injection site, located 3 km SW of the Hellisheidi power plant in SW-Iceland. Following the success of the pilot injections, the injection was scaled up to industrial scale at Hellisheidi geothermal power plant, operated by ON Power. A 65% CO2-35%H2S gas mixture is captured, dissolved in water in a dedicated water scrubbing tower and injected to about 800 m depth and about 230°C. The injection has been an integral part of the operation of the Hellisheidi Power Plant since June 2014 and has injected over 70,000 tonnes of CO2. Independent verification techniques have been developed which confirm that over 90% of the CO2 is mineralised within two years of injection. With the current capture capacity, approximately 12,000 tonnes of CO2/yr is captured which comprises about 30% of the power plant emission. This will be scaled up in steps until carbon neutrality will be reached by 2030.

After successful pilot testing of a direct air capture unit under the EU funded CarbFix2 project, Climeworks and Carbfix commissioned the first complete DACCS system with a capacity of 4000 tCO2/yr to be operational in the beginning of 2021. This will be the first complete DACCS chain in operation worldwide.

**Operational Status**

Pilot injections have been carried out since 2012 and industrial scale injection since 2014 and are currently ongoing. The DAC pilot unit is operational. The scaled-up DACCS system of 4000 tCO2/yr will be operational early 2021.

**Technology Description**

The process can be applied wherever favourable rock formations, water and a source of CO2 come together. The method provides a complete carbon capture and storage solution, where CO2 is dissolved in a dedicated water scrubbing tower under pressure and injected into subsurface favourable rock formations. There natural processes transform the CO2 solid carbonate minerals within a couple of years. The working pressure can be adapted to local conditions e.g. availability of water and energy prices. The CO2 can also be injected in the gas phase and dissolved in water down-hole.

**TRL Progression**

The core of the technology has progressed to TRL9 and is ready for industrial scale up. Other aspect of the technology e.g. using seawater as CO2 solvent instead of freshwater or applicability to other industrial streams have yet to be demonstrated outside the laboratory (TRL5-6).

The technology is not limited to geothermal plants, but can also be applied for coal, gas, cement, steel etc.

**CO2 Reduction Potential**

This cost-effective Carbon Capture and Mineralisation (CCM) technique has successfully mineralised over 70,000 tons CO2. Altogether, the global storage capacity in rocks is much larger than emissions from burning all fossil fuel available on Earth as reactive rocks such as basalts are among the most common rock types on Earth, covering a significant part of continental surfaces and most of the ocean floor.

**Project Financing**

Carbfix has been a part of several EU funded projects. The CarbFix2 Project is an EU H2020 funded research project that builds on the success of the previous EU funded project, CarbFix1. In addition, Carbfix has received funding for other projects, including GECO, S4CE, NORDICCS, and CO2-React.

ON Power, the sister company of Carbfix, has continuously invested in the technology. It is estimated that around 50 mEUR has been invested in the project since its beginning.

In terms of cost, The Carbfix method has proven to be extremely cost effective, with the cost of industrial scale Carbfix operations at Hellisheidi in Iceland being less than $25/ton, which is comparable with current price of ETS carbon quota and cheaper than conventional CCS methods.