Case Study # 24

Cryogenic Carbon Capture™ (CCC) in Cement and Concrete Production

Highlights:

- Ground Breaking Technology
- Successful full lifecycle and re-use of CO_2 in field demonstration
- Pilot Project— technology application proved to capture 96-98% of the CO_2 treated

Location: USA

Scope of Project:

- Test CCC during post-combustion cement production to cool the CO_2 laden flue emissions and separate out from other gases
- Using CCC technology process, produce liquid carbon dioxide (LCO_2) with very high purity for industry re-use downstream
- LCO_2 transported to construction site for injection into poured concrete to test positive effect on curing process

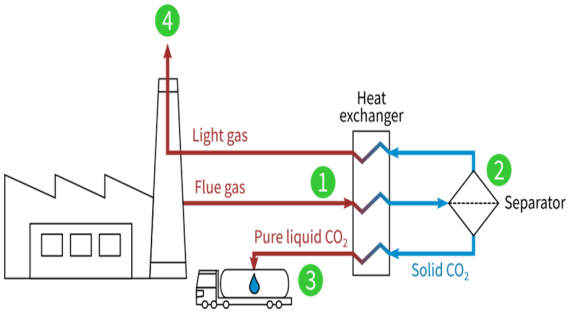
Application:

World's first integrated demonstration of CCC and Re-Use in the concrete and cement industry. The small scale pilot project set up to capture greenhouse gases in the form of carbon dioxide from flue gas, process and provide 1 tonne per day LCO_2. The captured carbon to be re-used by injecting into ready-mix concrete as part of curing process.

Project Background:

Cement industry generates approximately 5-8% of all CO_2 in the world. The pilot project needed to test CCC. Sustainable Energy Solutions (SES), a Chart Industries company, partnered with Argos' Roberta Cement to test on existing facility. The captured carbon required to be in liquid form for re-use study portion of the project, with another parther, CarbonCure Technologies.

System Configuration:



1. Flue gas is cooled
2. CO_2 is separated as a solid from the light gases
3. CO_2 is melted and prepared for transport
4. Light gases are reheated and released to atmosphere

Significant Accomplishments: Field tested the heat transfer process and desublimation on captured carbon. Produced CO_2 as a liquid ready for use at greater than 99% pure. Results showed decreased water demand requirement over competing systems. The compression step was eliminated as compared to other technologies, reducing energy requirements.

In Phase II, the liquid sequestered thru mineralization in concrete poured at CarbonCure's construction project outside of Atlanta. The result was permanent sequestration.