Carbonate Looping for De-Carbonization of Cement Plants

Cement industry is one of the largest emitter of CO2 other than power generation plants, which includes the emissions from combustion of fuel and also from calcination of limestone for clinker production. In order to reduce CO2 emissions from the cement industry an effective and economically feasible technology is to be developed. The carbonate looping process is a promising technology, which is particularly suitable for the cement industry as limestone could be used for capture and release of CO2. Integration of carbonate looping process into cement pyroprocess has two advantages: 1) to capture emitted CO2 and 2) to generate power for internal use, because high quality energy can be recovered from carbonate looping which is operated at high temperature unlike amine process. A simple carbonate looping process model was developed based on average conversion of calcined limestone defined by Abanades et al. The model is used to investigate the influence of average conversion of limestone in the carbonator on the flow rates of different streams in the looping process and energy required in the calciner for re-activation. The model developed is used for studying the carbonate looping process integrated into cement pyro-process. The energy required for regeneration in the calciner increases with increase in average conversion of calcined limestone and energy that can be extracted from carbonator decreases with increasing average conversion. Further the influence of type of limestone on the calciner capacity is also investigated. The results from this simple model show the importance of cement industry to the carbon capture technology for its application to power plants.

General information
Publication status: Published
Organisations: CHEC Research Centre, Department of Chemical and Biochemical Engineering, Riso National Laboratory for Sustainable Energy, FLSmidth & Co. A/S
Contributors: Pathi, S. K., Andersen, M. F., Lin, W., Illerup, J. B., Dam-Johansen, K., Hjuler, K.
Publication date: 2011

Host publication information
Title of host publication: 13. ICCC
Keywords: Cement plant, CO2 capture, Carbonate looping, Type of limestone
Electronic versions:
Abstract_for_ICCC.pdf
URLs:
http://www.icccmadrid2011.org/
Source: orbit
Source-ID: 276980
Research output: Chapter in Book/Report/Conference proceeding » Conference abstract in proceedings – Annual report
year: 2011 » Research » peer-review