

Retrofitting Cement Plants with Oxyfuel Technology for Carbon Capture

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Abstract : Methods for carbon capture and storage (CCS) can play a key role in the reduction of industrial CO₂ emissions, especially in the cement industry, which accounts for 7% of global emissions. Cement industries around the world have committed to address this problem by reaching carbon neutrality by the year 2050. The aim of the work to be presented was to contribute to the decarbonization strategy by integrating the 1st generation oxyfuel technology in cement production plants. This technology has been shown to improve fuel efficiency while providing one of the most cost-effective solutions when compared to other capture methods. A validated simulation of the cement plant was thus used as a basis to develop an oxyfuel retrofitted cement process. The process model for the oxyfuel technology is developed on the ASPEN (Advanced System for Process Engineering) PLUSTM simulation software. This process consists of an Air Separation Unit (ASU), an oxyfuel cement plant with coal and alternative solid fuel (ASF) as feedstock, and a carbon dioxide processing unit (CPU). A detailed description and analysis of the CPU will be presented, including the findings of a literature review and simulation results, regarding the effects of flue gas impurities during operation. Acknowledgment: This research has been conducted in the framework of the EU funded AC2OCEM project, which investigates first and the second generation oxyfuel concepts.

Keywords : oxyfuel technology, carbon capture and storage, CO₂ processing unit, cement, aspen plus

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