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## TECHNO-ECONOMIC AND ENVIRONMENTAL PERFORMANCE OF MINERAL CARBONATION PROCESS OF CEMENT KILN DUST FOR CARBON CAPTURE AND UTILIZATION

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Carbon dioxide capture and utilization (CCU) technologies are being developed to reduce greenhouse gas (GHG) emissions from the industrial sector and to obtain by-products with high added value. Mineral carbonation also called accelerated carbonation is one of the technologies that use CO<sub>2</sub> to form synthetic carbonate materials from the reaction between CO<sub>2</sub> and calcium or magnesium oxide compounds, present in industrial wastes. For economic and energy aspects, the main challenges in mineral carbonation are the acceleration of the rate of reaction and the reduction of the energy requirements in the stages before and after the reaction (material preparation, product separation, and purification). The profitability and environmental impact strongly vary from one industrial waste to another; for example, each waste shows a different availability, CO<sub>2</sub> uptake potential, price, and carbon footprint. Mineral carbonation includes converting the captured CO<sub>2</sub> into a product rich in synthetic calcium carbonates, either as a final product or as an input to the cement industry. In this work, an initial methodological approach is proposed to allow the integration of results from energy efficiency analysis, carbon footprinting, and techno-economic assessment for mineral carbonation in the aqueous phase, based on a hierarchical process simulation approach and optimization of operation conditions. In order to evaluate the feasibility of implementing a CO<sub>2</sub> capture process, the energy consumption in each process sub-stage is considered. The consumption of energy for each stage of the process influences the costs and also plays a more important role in the mineral carbonation when determining the net reduction of the process in terms of CO<sub>2</sub> captured and removed. These results will provide a better understanding of the capture technologies focused on the projection of CO<sub>2</sub> emissions in the cement Colombian industrial sector.

### Biography

Jennifer Pedraza is a Chemical Engineering (Universidad Nacional de Colombia, 2009) and has a Master degree in Environmental Engineering (Universidad Nacional de Colombia, 2014). She is currently PhD student and Researcher at Universidad Nacional de Colombia. Her research is focused on technical economic and environmental management for carbon capture and utilization technologies mainly mineral carbonation. Their current project is 'Carbon capture and sequestration to obtain usable materials'.

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