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# Calcium looping cycle for $CO_2$ capture: Performance, cost and feasibility analysis

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**Abstract**

Calcium looping (CaL) systems have been proposed as a lower-cost method of $CO_2$ capture for power plants. This paper presents the results of a techno-economic assessment of a CaL system for post-combustion $CO_2$ capture at a pulverized coal (PC) power plant. Comparisons are made with a conventional MEA-based $CO_2$ capture process in terms of performance and cost. Considering the significant quantities of solid flows required for a CaL process, the applicability and operational feasibility of a CaL system for new or existing PC power plants also is studied. It was found that though the CaL system has better performance than the MEA-based CO2 capture process, the capital cost of the power plant and the cost of electricity is much higher than when the MEA-based system is used.


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*Keywords:* $CO_2$ capture; calcium looping; post-combustion; techno-economic analysis

## 1. Introduction

The calcium looping (CaL) process utilizes the reversible chemical reaction between lime (CaO) and $CO_2$ in order to capture $CO_2$ from gaseous streams [1]. $CO_2$ in a gas stream reacts with CaO in an exothermic carbonation reaction to form $CaCO_3$ at temperatures in the range of 600-700°C. The product $CaCO_3$ from the carbonator is then sent to a separate vessel called a calciner where the calcination reaction takes place at a high temperature (around

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