

## Calcium looping process and its CO<sub>2</sub> capture applications

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A circulating fluidized bed system consisting of a carbonator and calciner, called calcium looping process, was devised to enable continuous CO<sub>2</sub> capture operation at a decent working capacity. A proper Ca-looping process design involves estimation of solid inventory, solid circulation and replenishment/purge rates as well as sizing the carbonator. To this end, a rather simple but robust mathematical model where the gas and solid phases are assumed plug flow and CSTR respectively can be utilised with satisfactory accuracy instead of more sophisticated models. It is crucial to combust fuels with pure oxygen to provide heat required for endothermic calcination. However, the power consumption for air separation is not trivial, compromising greatly its edge over other technologies. To circumvent the need for costly oxygen gas, two alternatives were proposed: indirect heating and chemical looping combustion. Ca-looping has been considered usually as an end-of-pipe technology for decarbonisation of power and industrial plants. But several process integration cases other than the simple bolt-on addition were also studied to facilitate its commercialisation.