



## Engineering challenges of ocean alkalinity enhancement

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The addition of calcium oxide (CaO) to the ocean as a means of enhancing the capacity of the ocean as a carbon sink was first proposed by Haroon Kheshgi in 1995. Calcium oxide is created by heating high purity limestone in a kiln to temperatures of approximately 1000°C. Addition of this material to the ocean draws carbon dioxide out of the atmosphere (approximately 1 tonne of CaO could sequester 1.3 tonnes of CO<sub>2</sub>). Abiotic carbonate precipitation is inhibited in the surface ocean. This is a carbon and energy expensive process, where approximately 0.8 tonnes of CO<sub>2</sub> are produced at a point source for every tonne sequestered. The feasibility of ocean alkalinity enhancement requires capture and storage of the point source of CO<sub>2</sub>.

We present details of a feasibility study of the engineering challenges of Kheshgi's method focusing on the potential scalability and costs of the proposed process. To draw down a PgC per year would require the extraction and processing of ~6Pg of limestone per year, which is similar in scale to the current coal industry. Costs are estimated at ~USD30-40 per tonne of CO<sub>2</sub> sequestered through the process, which is favourable to comparative processes.

Kheshgi, H. (1995) Energy 20 (9) 915-922