

## **RETAKE—Carbon Dioxide Removal by Alkalinity Enhancement: Potential, Benefits and Risks**

**Abstract:** The project will assess the potential, feasibility and side effects of various forms of alkalinity enhancement (AE) as a means to reliably and sustainably remove CO<sub>2</sub> from the atmosphere. Increased ocean alkalinity reduces the activity of CO<sub>2</sub> in seawater, and prompts an enhanced flux of CO<sub>2</sub> from the atmosphere into the ocean, thereby reducing the atmospheric CO<sub>2</sub> concentrations. A range of mineral alkalinity sources will be examined with respect to dissolution kinetics, CO<sub>2</sub> sequestration potential and side effects on chemistry and biology. Laboratory studies and mesocosm experiments of AE in benthic and pelagic systems will simulate realistic environments with focus on the Baltic and the North Sea. A hierarchy of numerical models will be used to simulate deployment in German coastal waters and elsewhere, and to extrapolate experimental results from local to regional and global scales. Permanence and accounting of carbon storage as well as monitoring, detection and attribution issues will be examined against the background natural variability. An investigation of economic aspects, the legal situation and the relation to the U.N. sustainability goals will complete the comprehensive assessment in order to inform policymakers about the feasibility, overall sequestration potential and environmental risks of ocean alkalinity enhancement.