HILTCRC

Australian Government
Department of Industry, Science and Resources

AusIndustry
Cooperative Research Centres Program

PROJECT SUMMARY

RP2.013: INTEGRATED CO2 CAPTURE AND SEQUESTRATION THROUGH MINERAL CARBONATION USING HEAVY INDUSTRY WASTE AND LOW-GRADE ORES FOR METAL RECOVERY AND VALUE-ADDED PRODUCTS

OVERVIEW

There is a growing urgency to develop techniques to capture CO_2 emissions economically and efficiently, whilst also utilising and then capitalising on the captured CO_2 as a valuable feedstock. On the other hand, heavy industry generates massive waste that can be re-utilised as feedstock for some of these techniques, leading to waste re-valorisation. This is critical as heavy industry waste volumes are also likely to increase in the medium-long term due to a gradual depletion of high-grade ores (with consequent use of lower grades, which require additional beneficiation steps), potentially creating a major environmental problem for the mining and heavy industry sectors.

This project aims to address existing challenges with MC processes from serpentinite and alkaline waste feedstock, via exploring innovative approaches to i) reduce the energy consumption of the thermal activation process for serpentinite ores, a step that presently requires large amount of energy, and to ii) deal with presence of silica, a common feature to many feedstocks, which imposes serious limitation on the overall efficiency of current processes.

PROJECT DETAILS

This project will assess the value proposition of a series of CO_2 mineral carbonation (MC) processes featuring novel heat activation strategies, use of renewable additives and/or chemical absorbents, and employing various low-grade ores and heavy industry alkaline wastes as feedstock. These processes will simultaneously serve both the purposes of carbon sequestration (from both CO_2 generated from process emissions, carbon-based fuel combustion, and/or direct air capture) and metal recovery (e.g., vanadium, cobalt, lithium and rare earths), together with synthesis of other value-added products (e.g., high-grade silica, sodium silicate).

PROJECT LEADER

- Dr Alfonso Chinnici,
  The University of Adelaide

INDUSTRIES

- Alumina
- Cement & Lime
- Iron & Steel

TOTAL PROJECT VALUE

- $3,156,172
  (cash and in kind)

COMMENCED

01 April 2024

END DATE

31 March 2027

IDENTIFIED PATHWAYS

Integrated CO_2 capture and re-use technologies and methods for industrial processes.

OUTCOMES

The outcomes of this project, is not only essential to overcome current limitations of MC processes but also accelerating the co-production of value-added products from MC processes and waste re-valorisation, leading to the development of an economically viable CO_2 capture and utilisation processes.