

Carbon Mineralization Potential Assessment at a proposed Carbon Dioxide Removal (CDR) Hub in Québec, Canada

BART DE BAERE¹, DR. JULIEN DECLERCQ, MSC, PHD
¹, RHYS JOHN SAVAGE² AND CHRIS EVANS³

¹WSP

²Isometric

³Winsome Resources

The mining sector is particularly well-positioned to adopt carbon dioxide removal (CDR) technologies due to its access to the necessary raw materials, the scale of operations, existing infrastructure, the potential for environmental and economic benefits, and growing regulatory and market incentives (e.g., Carbrera et al 2022; Hitch et al, 2010).

Winsome Resources is exploring the potential of the Renard Operation, a diamond mine in Québec, as a dual-use hub that integrates lithium production with CDR technologies. Suitable feedstock under the form of processed kimberlite material, rich in magnesium-bearing minerals like olivine and serpentine, reacts with atmospheric CO₂, converting it into stable, secondary carbonate minerals (e.g., Snæbjörnsdóttir et al 2020). The development of a CDR hub at Renard aims to optimize existing infrastructure and stockpiled materials, aligning environmental and economic goals, and positioning the site as one of the first to integrate large-scale CDR alongside mining operations.

With an exclusive option to acquire Renard, Winsome has partnered with Isometric, a carbon registry, WSP, a global professional services firm, and several CDR technology suppliers to test and evaluate CDR pathways at the site, including enhanced surficial weathering, ex-situ mineral carbonation, and the use of the existing pit lake for atmospheric CO₂ absorption.

Initial feasibility work included a quantitative carbon mineralization assessment, which reviewed available geochemical data, identified data gaps, and estimated the carbon sequestration potential of mining by-products and a carbon mineralization implementation plan, which assessed potential flaws, outlined a field-scale testing timeline, recommended a geochemical sampling program, and explored integrating carbon mineralization into low-carbon production methods.

This case study serves to summarise, highlight and quantify ongoing efforts to adopt and scale novel CDR pathways in the mining sector.

References cited:

Cabrera, G., Dickson, A., Nimubona, A. D., & Quigley, J. (2022), *International Journal of Greenhouse Gas Control* 120, 103756.

Hitch, M., Ballantyne, S. M., & Hindle, S. R. (2010), *International Journal of Mining, Reclamation and Environment* 24(1), 64-79.

Snæbjörnsdóttir, S. Ó., Sigfússon, B., Marieni, C., Goldberg, D., Gislason, S. R., & Oelkers, E. H. (2020), *Nature Reviews*