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Project Earthstone: An Enhanced Weathering Pilot Project Using Ferronickel Slag in Brazil

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Project Earthstone is a pilot-scale enhanced rock weathering (ERW) project that repurposes ferronickel slag as a feedstock for carbon dioxide removal (CDR) in Goiás, Brazil. This industry by-product, generated from nickel processing operations, is predominantly composed of magnesium-rich silica glass and forsterite, with an overall MgO content of approximately 28 wt%. Currently, greater than 2 million tons of this material is produced annually, providing a unique opportunity for easily accessible feedstock supporting circular economic principles.

In 2024, Project Earthstone deployed its feedstock across 2 farm sites in Goiás, Brazil totaling ~1400 ha. The material was applied at a rate of 2.5 to 5 tons per hectare in a regionally typical soybean-maize rotation. In 2025, the project expanded on 3 new farms to a total of ~4000 ha, making it one of the largest ERW pilot trials deployed globally.

The project utilizes extensive soil, porewater, and biomass measurements to characterize the weathering rate of the feedstock, the associated carbon sequestration, and agronomic co-benefits of this material in Brazilian agriculture. CDR has been quantified using soil-based mass balance calculations along with cumulative suction lysimeter data. Preliminary data collected from samples taken 6 months after feedstock deployment indicate that 39.4 ± 4.2% (mean ± standard deviation) and 44.3 ± 6.2% of the total Mg found within the feedstock weathered in only one wet season. This high weathering rate supports the conclusion that the feedstock could be highly suitable for wider scale ERW in Brazil. Additionally, qualitative increases in yield were observed as a result of feedstock amendment, reinforcing the agronomic value and strengthening the business case of the material.