

August 30, 2023

# Verde's Products Remove Carbon Dioxide from Air in Mere Months of Application

## New research shows that Verde's Products may undergo Enhanced Rock Weathering faster than other minerals

**Singapore. Verde AgriTech Ltd** (TSX: "NPK") ("Verde" or the "Company") is pleased to announce that its K Forte® and Super Greensand® ("Products") undergo mineral dissolution in only a matter of months to a year from its application to soils, faster than the most rapid reacting silicate minerals (forsterite), which takes years to decades for a similar dissolution. Mineral dissolution is directly correlated to the capture of carbon dioxide ("CO<sub>2</sub>") from the atmosphere, the faster the dissolution the faster the absorption of CO<sub>2</sub>. The conclusion was reached by a commissioned study conducted by Phil Renforth, Ph.D., at Heriot Watt University, based on peer-reviewed publication and commercial data (the "Study").

### SPEED OF ENHANCED ROCK WEATHERING

Enhanced Rock Weathering ("ERW") refers to a suite of techniques aimed at accelerating natural rock weathering, which involves the breakdown of minerals and the absorption of CO<sub>2</sub> from the atmosphere. In nature, the process takes centuries as the rocks' surface is gradually weathered down and reacts with CO<sub>2</sub> to form new stable carbonate minerals or bicarbonate ions, effectively removing CO<sub>2</sub> from the atmosphere and storing it for thousands of years.

By crushing and grinding such minerals and spreading it over large areas, ERW significantly accelerates the absorption of CO<sub>2</sub>. The speed of mineral weathering can be calculated using a 'shrinking core model', which assumes that the reaction occurs at the surface of the mineral so that the unreacted core gradually shrinks over time.

To calculate the Products' speed of weathering, Verde engaged Dr. Renforth, who leads the carbon dioxide removal research group Heriot Watt University's Research Centre for Carbon Solutions. Dr. Renforth is a widely respected specialist in enhanced weathering. He is co-chief editor for *Frontiers in Climate: Negative Emission Technologies*, the world's first dedicated publication in this space; Dr. Renforth was a contributing author to Chapter 12 of the Working Group III's 6th Assessment Report from the IPCC; he is also one of 12 judges for the Carbon Removal XPrize, the largest incentive prize in history.<sup>1</sup> Dr. Renforth has extensive research and publications on enhanced weathering, negative emission technologies and alkaline waste.<sup>2</sup>

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<sup>1</sup> For details, see link: [\\$100M Prize For Carbon Removal | XPRIZE Foundation](#)

<sup>2</sup> For a list of Dr. Renforth's publications, see: <https://scholar.google.co.uk/citations?user=TaWhvvgAAAAJ&hl=en&oi=ao>

Dr. Renforth applied the shrinking core model to Verde's Products to calculate the speed of its dissolution. The shrinking core model considers various factors that influence weathering, such as particle size and surface area of the minerals, temperature, and the rate of mass transfer. By incorporating these parameters into the model, it is possible to estimate the rate at which minerals within Verde's products dissolve through enhanced weathering.<sup>3</sup> Relating mineral dissolution to carbon dioxide uptake is a challenge for enhanced weathering projects who are implementing a range of strategies from modelling to gathering empirical evidence. A shrinking core model does not simulate complex environmental chemistry but is the first step in understanding the relationship between mineral weathering and CO<sub>2</sub> uptake.

The model results projected two scenarios, reflecting different external factors such as temperature and soil pH, resulting in both a fast and a slow dissolution. The results of the modelling on Verde's Products suggest that under the 'fast reaction scenario' its dissolution will reach competition on the order of several months, and for the 'slow reaction scenario' its dissolution will reach competition in slightly over 1 year. When applied to olivine, a mineral commonly considered for ERW, the fast scenario took years and the slow scenario spanned decades to reach competition.

Dr. Renforth commented: "To meet their Paris climate targets,<sup>4</sup> governments need scale up methods to curb greenhouse emissions and develop those that remove of atmospheric carbon dioxide, ERW may be a scalable and relatively low-cost tool in this process. Verde Agritech overcomes two of the major obstacles for ERW at scale: first, consistent production of fine milled material and, secondly, uses a mineral that can rapidly dissolve."

Globally, there are several different ERW initiatives , though none stemming originally from a plant-nutrition focus such as Verde's. These include CarbFix,<sup>5</sup> from Iceland, which utilizes industrial processes to lock CO<sub>2</sub> into basaltic rocks; Project Vesta,<sup>6</sup> which spreads olivine-rich minerals on beaches and coastal environments to facilitate carbon sequestration; and UNDO,<sup>7</sup> in the UK, that uses crushed basalt applied to farmland.

"While we salute all ERW initiatives, we need to move with all deliberate speed to help mitigate the buildup of greenhouse gases in our atmosphere. In a matter of months, Verde's Products capture 1 tonne of CO<sub>2</sub> for every 8.3 tonnes applied to fields and may be significantly faster than any other major ERW project

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<sup>3</sup> See Palandri, J. L. & Kharaka, Y. K. A Compilation of Rate Parameters of Water-Mineral Interaction Kinetics for Application to Geochemical Modeling. in (2004). doi:10.3133/ofr20041068.

<sup>4</sup> The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. It entered into force on 4 November 2016. Its overarching goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels." Source: United Nations Climate Change. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement>

<sup>5</sup> <https://www.carbfix.com/>

<sup>6</sup> <https://www.vesta.earth/>

<sup>7</sup> <https://un-do.com/>



globally. Verde's Products have a distinguished role to play, a role which is already in progress and will only grow as we increase our output", commented Cristiano Veloso, Verde's Founder and CEO.

## ABOUT VERDE AGRITECH

Verde is an agricultural technology Company that produces potash fertilizers. Our purpose is to improve the health of all people and the planet. Rooting our solutions in nature, we make agriculture healthier, more productive, and profitable.

Verde is a fully integrated Company: it mines and processes its main feedstock from its 100% owned mineral properties, then sells and distributes the Product.

Verde's focus on research and development has resulted in one patent and eight patents pending. Among its proprietary technologies are Cambridge Tech, 3D Alliance, MicroS Technology, N Keeper, and Bio Revolution.<sup>8</sup> Currently, the Company is fully licensed to produce up to 2.8 million tonnes per year of its multinutrient potassium fertilizers K Forte® and BAKS®, sold internationally as Super Greensand®. In 2022, it became Brazil's largest potash producer by capacity.<sup>9</sup> Verde has a combined measured and indicated mineral resource of 1.47 billion tonnes at 9.28% K<sub>2</sub>O and an inferred mineral resource of 1.85 billion tonnes at 8.60% K<sub>2</sub>O (using a 7.5% K<sub>2</sub>O cut-off grade).<sup>10</sup> This amounts to 295.70 million tonnes of potash in K<sub>2</sub>O. For context, in 2021 Brazil's total consumption of potash in K<sub>2</sub>O was 6.57 million<sup>11</sup>.

Brazil ranks second in global potash demand and is its single largest importer, currently depending on external sources for over 97% of its potash needs. In 2022, potash accounted for approximately 3% of all Brazilian imports by dollar value.<sup>12</sup>

## CORPORATE PRESENTATION

For further information on the Company, please view shareholders' deck:

<https://verde.docsend.com/view/zmsspzpkh2hq4mnx>

## INVESTORS NEWSLETTER

Subscribe to receive the Company's updates at: <http://cloud.marketing.verde.ag/InvestorsSubscription>

The last edition of the newsletter can be accessed at: [https://bit.ly/InvestorNL\\_July2023](https://bit.ly/InvestorNL_July2023)

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<sup>8</sup> Learn more about our technologies: <https://verde.docsend.com/view/yvthnpuv8jx6g4r9>

<sup>9</sup> See the release at: <https://investor.verde.ag/verde-starts-ramp-up-of-plant-2s-second-stage-to-reach-production-of-2-4mtpy/>

<sup>10</sup> As per the National Instrument 43-101 Standards of Disclosure for Mineral Projects within Canada ("NI 43 -101"), filed on SEDAR in 2017. See the Pre-Feasibility Study at: <https://investor.verde.ag/wp-content/uploads/2021/01/NI-43-101-Pre-Feasibility-Technical-Report-Cerrado-Verde-Project.pdf>

<sup>11</sup> Source: Brazilian Fertilizer Mixers Association (from "Associação Misturadores de Adubo do Brasil", in Portuguese).

<sup>12</sup> Source: Brazilian Comex Stat, available at: <http://comexstat.mdic.gov.br/en/geral>

## CAUTIONARY LANGUAGE AND FORWARD-LOOKING STATEMENTS

All Mineral Reserve and Mineral Resources estimates reported by the Company were estimated in accordance with the Canadian National Instrument 43-101 and the Canadian Institute of Mining, Metallurgy, and Petroleum Definition Standards (May 10, 2014). These standards differ significantly from the requirements of the U.S. Securities and Exchange Commission. Mineral Resources which are not Mineral Reserves do not have demonstrated economic viability.

This document contains "forward-looking information" within the meaning of Canadian securities legislation and "forward-looking statements" within the meaning of the United States Private Securities Litigation Reform Act of 1995. This information and these statements, referred to herein as "forward-looking statements" are made as of the date of this document. Forward-looking statements relate to future events or future performance and reflect current estimates, predictions, expectations or beliefs regarding future events and include, but are not limited to, statements with respect to:

- (i) the estimated amount and grade of Mineral Resources and Mineral Reserves;
- (ii) the estimated amount of CO<sub>2</sub> removal per tonne of rock;
- (iii) the PFS representing a viable development option for the Project;
- (iv) estimates of the capital costs of constructing mine facilities and bringing a mine into production, of sustaining capital and the duration of financing payback periods;
- (v) the estimated amount of future production, both produced and sold;
- (vi) timing of disclosure for the PFS and recommendations from the Special Committee;
- (vii) the Company's competitive position in Brazil and demand for potash; and,
- (viii) estimates of operating costs and total costs, net cash flow, net present value and economic returns from an operating mine.

Any statements that express or involve discussions with respect to predictions, expectations, beliefs, plans, projections, objectives or future events or performance (often, but not always, using words or phrases such as "expects", "anticipates", "plans", "projects", "estimates", "envisages", "assumes", "intends", "strategy", "goals", "objectives" or variations thereof or stating that certain actions, events or results "may", "could", "would", "might" or "will" be taken, occur or be achieved, or the negative of any of these terms and similar expressions) are not statements of historical fact and may be forward-looking statements.

All forward-looking statements are based on Verde's or its consultants' current beliefs as well as various assumptions made by them and information currently available to them. The most significant assumptions are set forth above, but generally these assumptions include, but are not limited to:

- (i) the presence of and continuity of resources and reserves at the Project at estimated grades;

- (ii) the estimation of CO<sub>2</sub> removal based on the chemical and mineralogical composition of assumed resources and reserves;
- (iii) the geotechnical and metallurgical characteristics of rock conforming to sampled results; including the quantities of water and the quality of the water that must be diverted or treated during mining operations;
- (iv) the capacities and durability of various machinery and equipment;
- (v) the availability of personnel, machinery and equipment at estimated prices and within the estimated delivery times;
- (vi) currency exchange rates;
- (vii) Super Greensand® and K Forte® sales prices, market size and exchange rate assumed;
- (viii) appropriate discount rates applied to the cash flows in the economic analysis;
- (ix) tax rates and royalty rates applicable to the proposed mining operation;
- (x) the availability of acceptable financing under assumed structure and costs;
- (xi) anticipated mining losses and dilution;
- (xii) reasonable contingency requirements;
- (xiii) success in realizing proposed operations;
- (xiv) receipt of permits and other regulatory approvals on acceptable terms; and
- (xv) the fulfilment of environmental assessment commitments and arrangements with local communities.

Although management considers these assumptions to be reasonable based on information currently available to it, they may prove to be incorrect. Many forward-looking statements are made assuming the correctness of other forward looking statements, such as statements of net present value and internal rates of return, which are based on most of the other forward-looking statements and assumptions herein. The cost information is also prepared using current values, but the time for incurring the costs will be in the future and it is assumed costs will remain stable over the relevant period.

By their very nature, forward-looking statements involve inherent risks and uncertainties, both general and specific, and risks exist that estimates, forecasts, projections and other forward-looking statements will not be achieved or that assumptions do not reflect future experience. We caution readers not to place undue reliance on these forward-looking statements as a number of important factors could cause the actual outcomes to differ materially from the beliefs, plans, objectives, expectations, anticipations, estimates assumptions and intentions expressed in such forward-looking statements. These risk factors may be generally stated as the risk that the assumptions and estimates expressed above do not occur as forecast,

but specifically include, without limitation: risks relating to variations in the mineral content within the material identified as Mineral Resources and Mineral Reserves from that predicted; variations in rates of recovery and extraction; the geotechnical characteristics of the rock mined or through which infrastructure is built differing from that predicted, the quantity of water that will need to be diverted or treated during mining operations being different from what is expected to be encountered during mining operations or post closure, or the rate of flow of the water being different; developments in world metals markets; risks relating to fluctuations in the Brazilian Real relative to the Canadian dollar; increases in the estimated capital and operating costs or unanticipated costs; difficulties attracting the necessary work force; increases in financing costs or adverse changes to the terms of available financing, if any; tax rates or royalties being greater than assumed; changes in development or mining plans due to changes in logistical, technical or other factors; changes in project parameters as plans continue to be refined; risks relating to receipt of regulatory approvals; delays in stakeholder negotiations; changes in regulations applying to the development, operation, and closure of mining operations from what currently exists; the effects of competition in the markets in which Verde operates; operational and infrastructure risks and the additional risks described in Verde's Annual Information Form filed with SEDAR in Canada (available at [www.sedar.com](http://www.sedar.com)) for the year ended December 31, 2021. Verde cautions that the foregoing list of factors that may affect future results is not exhaustive.

When relying on our forward-looking statements to make decisions with respect to Verde, investors and others should carefully consider the foregoing factors and other uncertainties and potential events. Verde does not undertake to update any forward-looking statement, whether written or oral, that may be made from time to time by Verde or on our behalf, except as required by law.

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