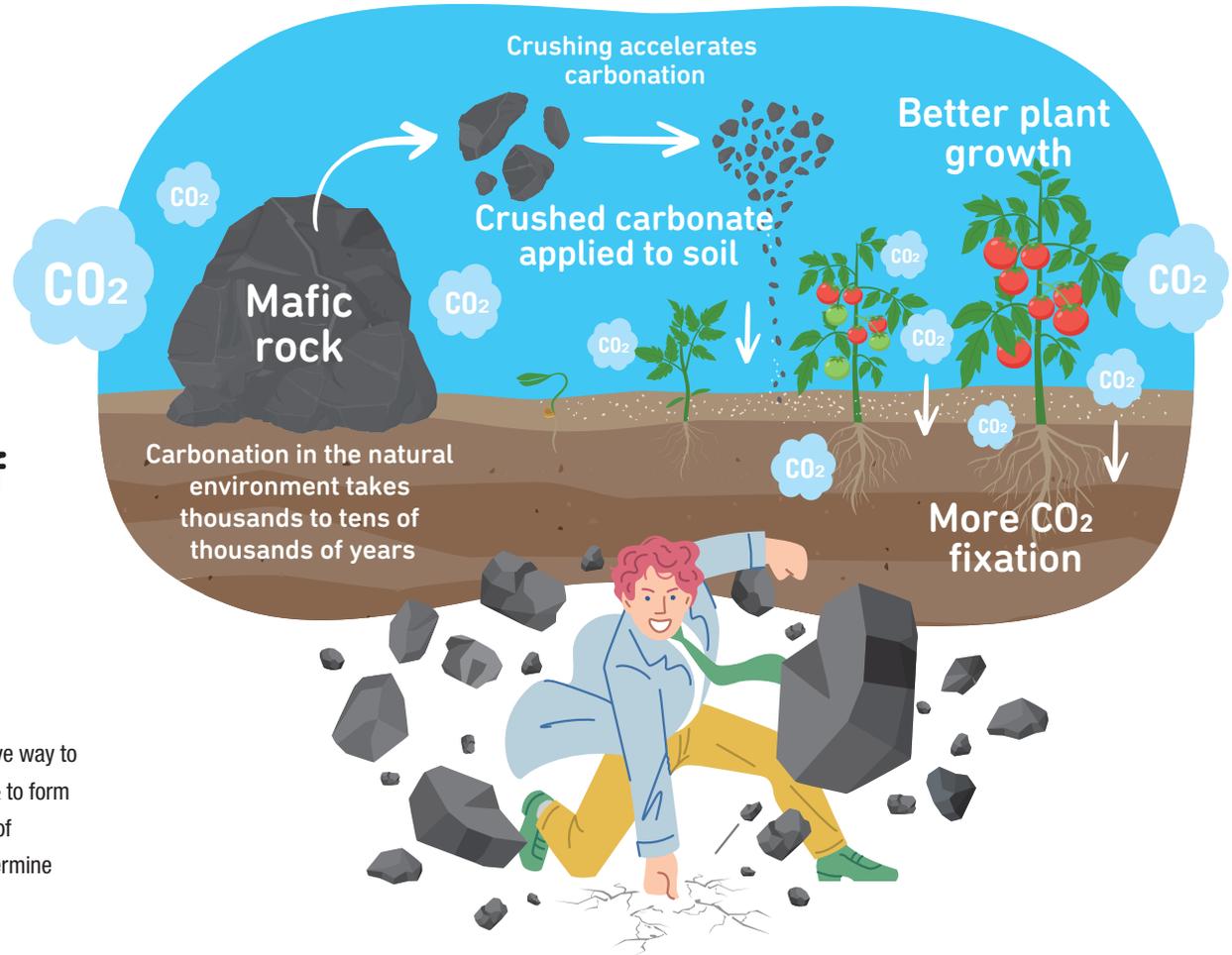


# Tackling Current Problems with Solutions Transcending Time and Space: The Appeal of Enhanced Rock Weathering

## Establishing a Platform for Evaluating LCA/TEA in Research and Development of Enhanced Weathering Systems

Some types of rock on Earth are capable of fixing CO<sub>2</sub>, making rock weathering an effective way to sequester atmospheric CO<sub>2</sub>. As dissolution occurs, elements of the rock combine with CO<sub>2</sub> to form carbonates, but this process normally takes place over eons. We are building a database of information on conditions that enable artificial acceleration of weathering, and aim to determine the optimal system for introducing enhanced mineralization on a global scale.



### Developing an Analytical Tool for Use Worldwide

Dr. MORIMOTO Shinichirou

National Institute of Advanced Industrial Science and Technology (AIST)

To achieve the social implementation of enhanced weathering technology, we are developing a tool to analyze the optimal conditions for fixing atmospheric CO<sub>2</sub> using the natural process of rock weathering. Rocks that undergo enhanced weathering not only help counter global warming by fixing CO<sub>2</sub>; they enhance the growth of agricultural crops. Enhanced weathering is expected to create jobs and provide other related economic benefits as well. The “optimal condition” is a beacon for a prosperous society woven from enhanced weathering and human activity. Researchers with various specialties are collaborating and working together to achieve this.

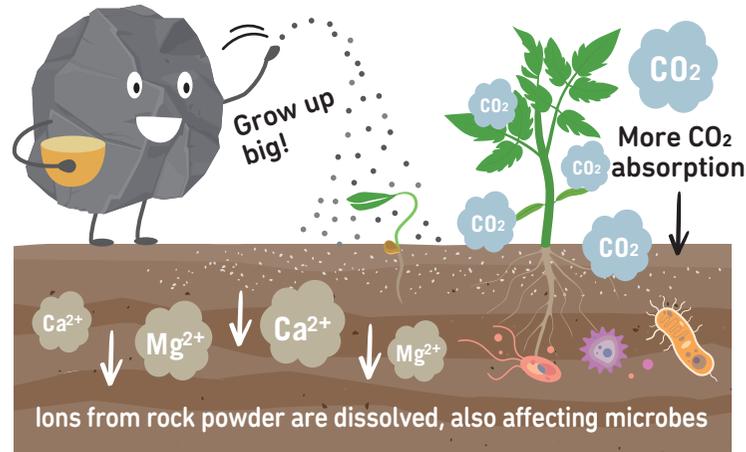
## Tackling Current Problems with Solutions Transcending Time and Space: The Appeal of Enhanced Rock Weathering

### >> The Challenge of Dealing with Nature

In order to artificially accelerate weathering, rocks are crushed and applied to soil, where they react with CO<sub>2</sub> to form carbonates. However, there is a major pitfall here; the energy required to crush the rocks also emits CO<sub>2</sub> into the atmosphere. Therefore, enhanced weathering needs to take this CO<sub>2</sub> into account. Furthermore, accelerating the adoption of enhanced weathering requires that the process be accompanied by other benefits to society besides CO<sub>2</sub> fixation. Therefore, calculating carbon balances and assessing effectiveness requires an evaluation tool that simultaneously calculates economic effects.

### >> Japanese Technology Leads the World

Using the evaluation tool being developed in this project, we will analyze and quantitatively evaluate a wide range of factors, including CO<sub>2</sub> emissions and fixation, rock characteristics, and location characteristics, including the distance from quarry to application site. Furthermore, by analyzing the results in



conjunction with a business profitability evaluation based on Techno-Economic Analysis (TEA), we will identify the optimal conditions for the social implementation of enhanced weathering in each area. The development of a systematized [LCA/TEA evaluation tool](#) based on a vast database will contribute to suggesting optimal conditions for the world's first enhanced weathering projects.

## KEYWORD

### LCA/TEA (Life Cycle Assessment/ Techno-Economic Analysis) Evaluation Tool

This tool analyzes various characteristics of the land, taking into account future economic effects and risk assessments, and compares it against a vast amount of research data from a wide range of fields to identify the optimal conditions for enhanced weathering.

2025

# FUTURE VISION

## Solidify the Foundation for Gathering Data

We will develop measurement technology to build a precision database regarding CO<sub>2</sub> fixation.



2027

## Data Collection

Through a wide variety of experiments conducted both indoors and outdoors, we will continue to accumulate large amounts of data on CO<sub>2</sub> fixation. We aim to deepen our collaborations with overseas partners and garner international recognition for these data measurement methods.



2029

## Anticipate Social Implementation

We will collect empirical data to promote the commercialization of enhanced weathering and complete the business design. With internationally recognized data, we aim to create conditions for market establishment and overseas expansion.

