



SCCS

Annual Conference 2023

The Carbon Landscape:  
Methods & Metrics of CO<sub>2</sub> Storage

# Perspectives on enhanced rock weathering (ERW) for CO<sub>2</sub> drawdown

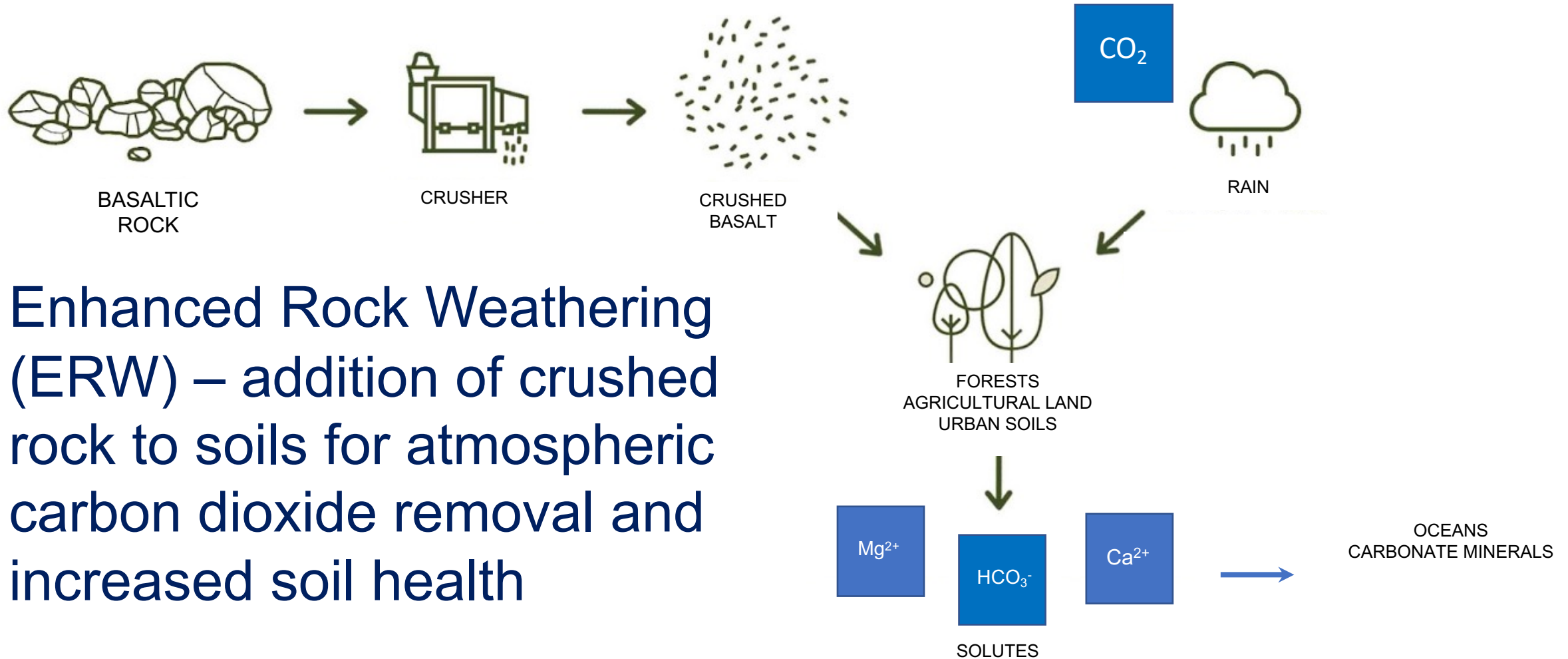
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With thanks to Amanda Stubbs and Mel Murphy

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# What is Enhanced Rock Weathering?



- Enhanced Rock Weathering (ERW) – addition of crushed rock to soils for atmospheric carbon dioxide removal and increased soil health

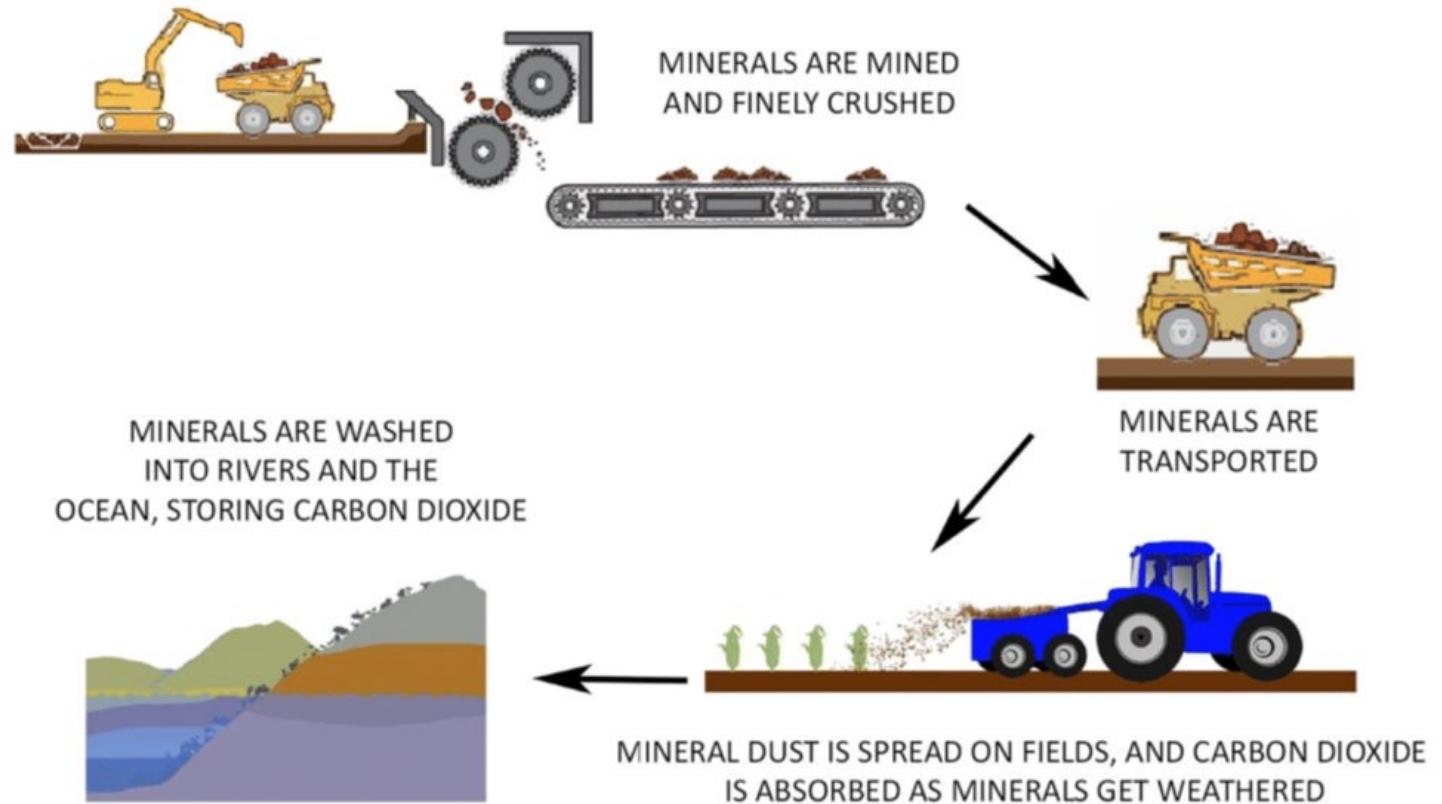
What is ERW?

Implementing ERW

Scottish Perspectives

# What is Enhanced Rock Weathering?

- IPCC – carbon dioxide removal approaches such as ERW essential
- Co-benefits for soil health from addition of nutrients from crushed rock
  - Increase soil alkalinity in less productive acidic soils
  - Increases crop yield



What is ERW?

Implementing ERW

Scottish Perspectives

- Research ongoing into deployment in:
  - Arable cropland
  - Grassland pasture (upland and lowland)
  - Recreational spaces e.g. golf courses
  - Vacant and derelict land in urban spaces
  - Forestry
  - Mine and quarry waste impoundments

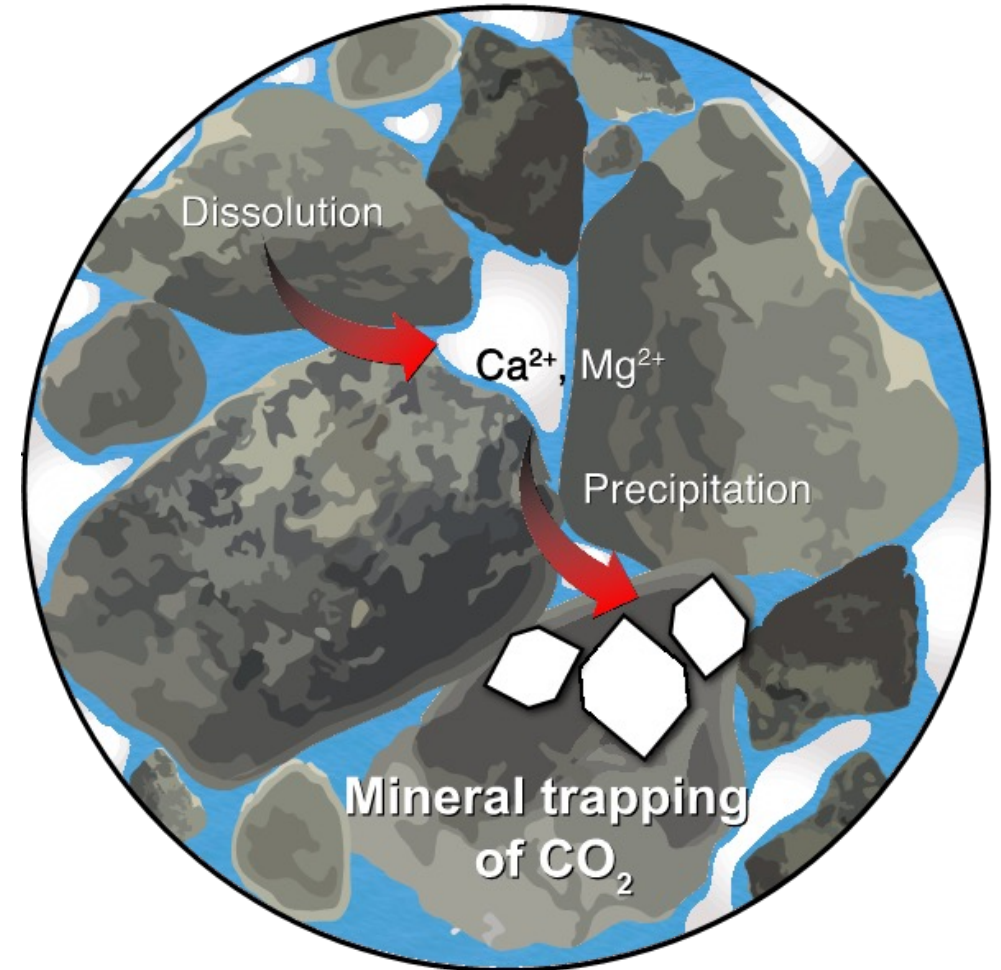


What is ERW?

Implementing ERW

Scottish Perspectives

- How is the CO<sub>2</sub> trapped and stored?
  - Dissolved in soil porewaters, eventually ending up in the ocean for ocean alkalinity enhancement and long-term storage
  - Mineral trapping as carbonate minerals in the soil



## Strengths

- Utilising by-product from aggregate quarrying which has suitable composition and particle size
- Uses existing agriculture infrastructure (spreaders)
- Can be deployed anywhere with soil

## Weaknesses

- Knowledge gaps where more research is needed, particularly to allow for validation of carbon credits
- Lack of management practices/regulatory framework

## Opportunities

- Active quarries in basaltic rock producing the feedstock across Scotland, UK and the World
- Enormous capacity for scaling up, nationally and globally
- Industry interest/expertise to further develop approach

## Threats

- Release of ecotoxic metals from the rock - regulatory framework required to ensure source rock is screened to eliminate this risk

What is ERW?

Implementing ERW

Scottish Perspectives

- Can be deployed anywhere so more flexible than offshore subsurface CCS clusters
- Scotland is already a world-leader in ERW
  - Sector-leading project developer UNDO is operating predominantly in Central Scotland
  - Scotland has lots of basalt feedstock (~50 active basalt quarries)
  - Scotland has lots of acidic soil where ERW works best

What is ERW?

Implementing ERW

Scottish Perspectives

- R&D investment in MRV (monitoring reporting & validation) needed, to allow validation for carbon credits, and bring down costs
  - Carbon credit and registry companies
  - Academic
- With significant scaling up, Kantzas et al (2022, Nature Geoscience) estimated that ERW could provide **up to 45%** of the atmospheric carbon removal national requirement for the UK

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Thank you

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