Presentation 1

Development of Environmentally Friendly Concrete for Realizing Decarbonized Society SUSMICS®-C / DAC Coat®

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Sustainability Management Policy

The Group's Environmental Vision "SHIMZ Beyond Zero 2050"

We are committing ourselves to must achieve net zero emissions, a final waste zero, and zero negative impact on the environment in 2050

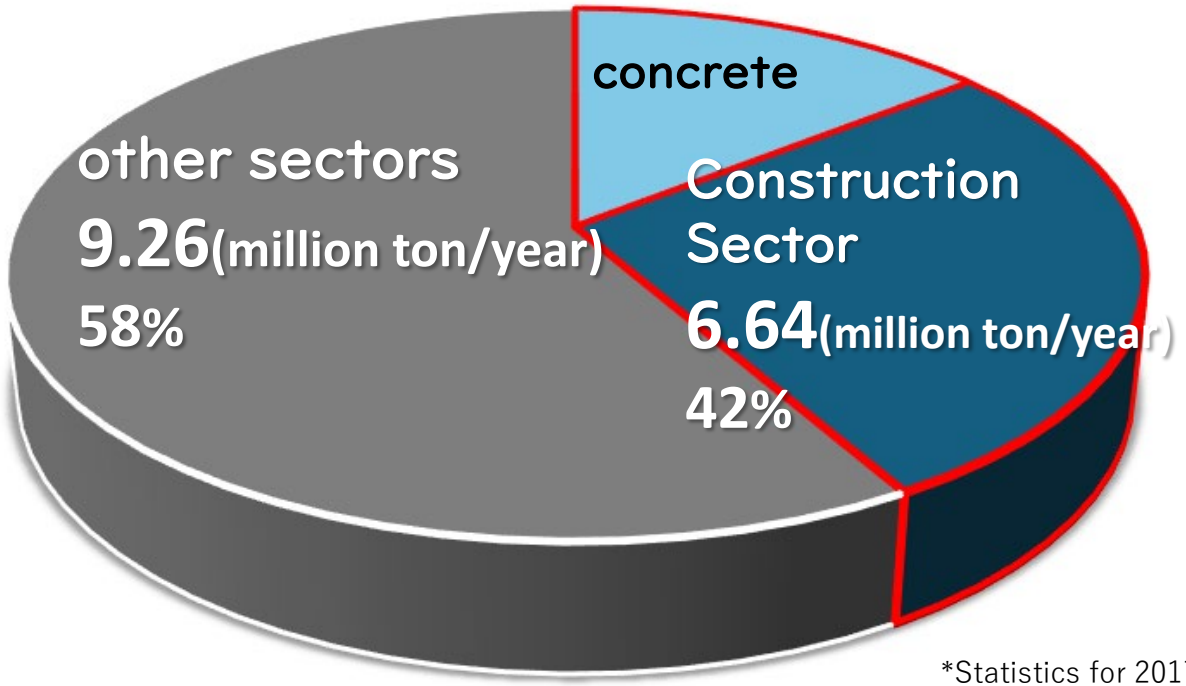
Mid-Term Business Plan <2024-2026> Decarbonization-related KPIs (2026 Targets)

Reduction rate of CO2 emissions in the Construction Business (compared with FY2023)

≥ 12%

The Situation Surrounding Concrete

Japan's Total Material Input



*Statistics for 2017

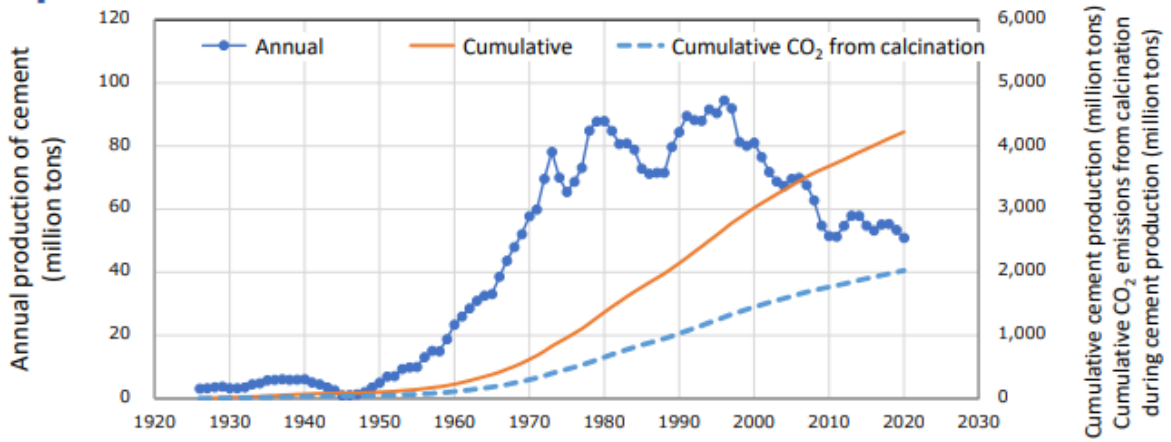
The construction sector accounts for 42%

→ Of which concrete accounts for 34%

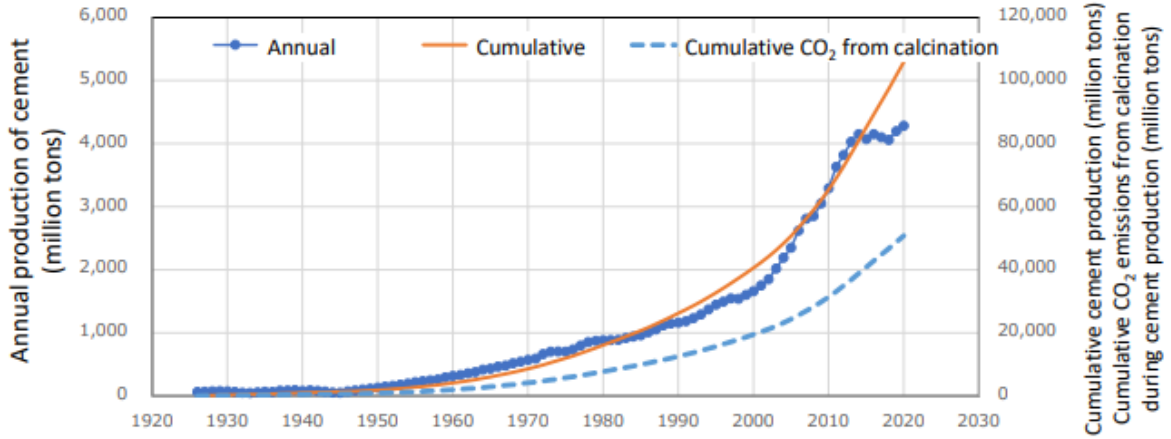
From Moonshot Project materials (https://moonshot-c4s.jp/en/)

Cement Production Volume and CO_2 Emissions

Japan



World

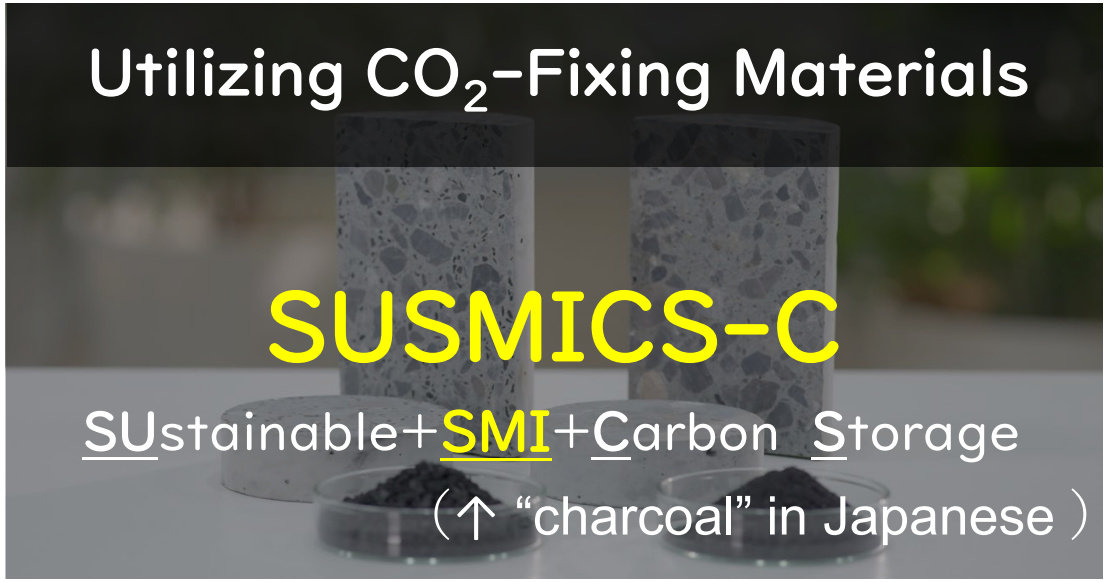


World : Over 50 billion tons

Japan : Over 2 billion tons

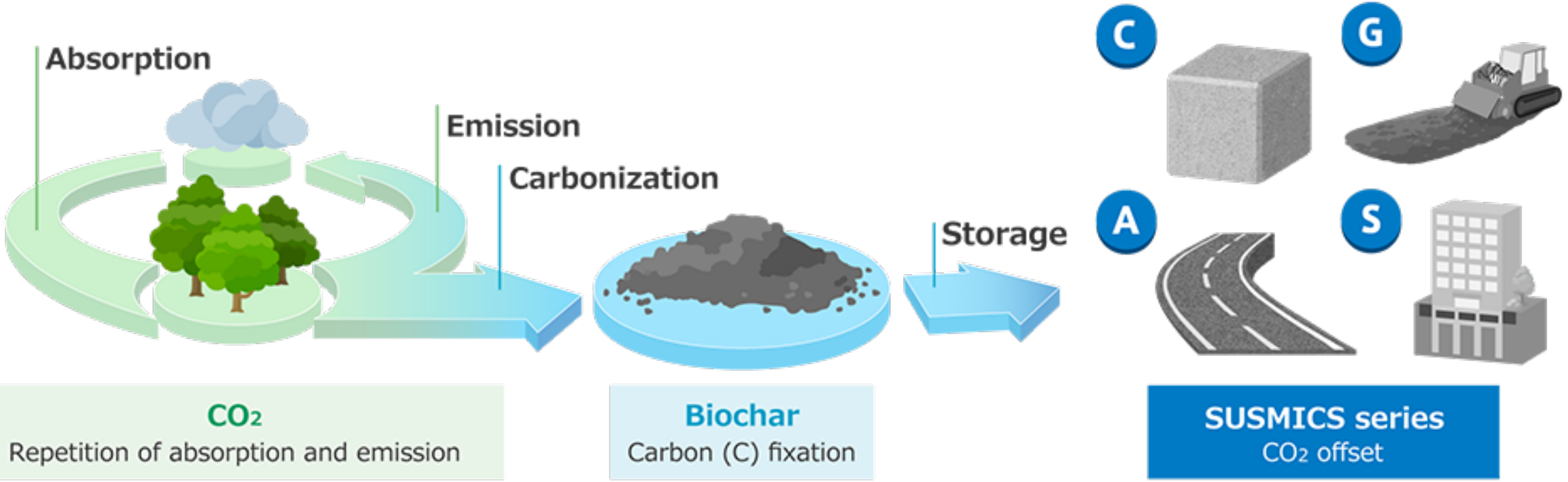
of CO_2 are emitted

Classification of Environmentally-Friendly Concrete



Concrete (as a material) makes a significant contribution to **decarbonization**.

Carbon Storage by Biochar



- By carbonizing biomass, CO_2 absorbed from the atmosphere during the course of tree growth is fixed as long-term stable carbon in biochar.
- By incorporating biochar into concrete, CO_2 absorbed by trees is fixed within the concrete.

Features of SUSMICS-C

Highly Versatile

No special equipment required; production possible at ready-mix plants nationwide
Workability and quality (strength, durability, etc.) **equivalent to general concrete**

Enables Efficient CDR (carbon dioxide removal)

CO_2 fixation capacity per kg is over 8 times that of calcium carbonate
Biochar (CO_2 /C): 3.6 kg-CO_2 /kg
Calcium Carbonate (CO_2 /$CaCO_3$): 0.44 kg-CO_2 /kg

Can Be Used In Combination with Low-Carbon Cement

Can be combined with low-carbon cements such as Type B and Type C blast furnace cement enables **carbon neutrality and carbon-negative** outcomes

SUSMICS-C: Field Applications and Third-Party Verification

Field Applications

	Civil Engineering	Building Construction
Emissions Reduction Rate	99%	111%
Construction Volume	34.5m^3	510m^3
CO_2 emissions reduction by biochar	Approx. **4.7** t-CO_2	Approx. **62.8** t-CO_2

Third-Party Verification

Carbon negative verification by Socotec Certification Japan Co., Ltd.

Civil Engineering Works


Building Construction

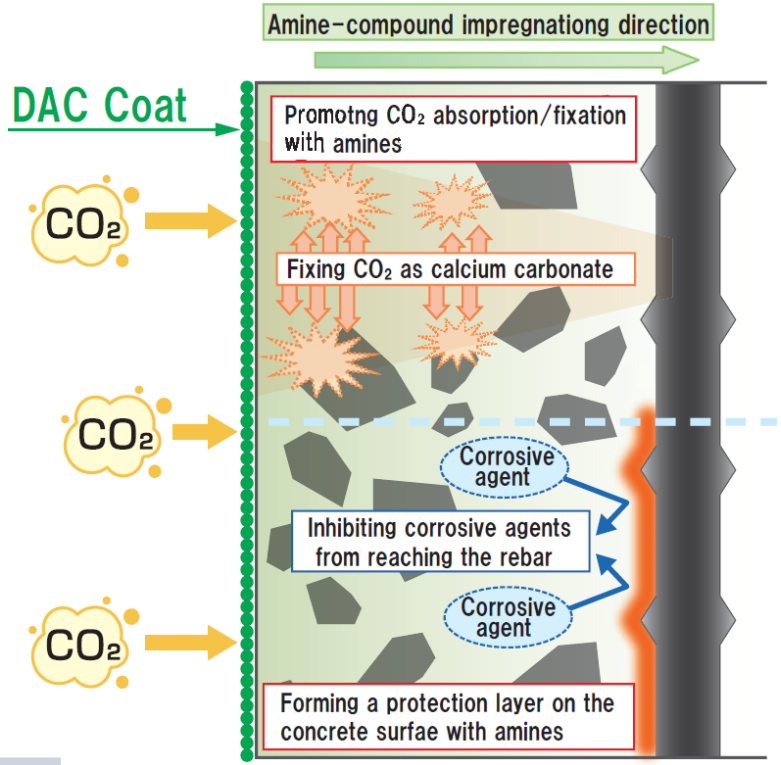
https://www.nies.go.jp/whatsnew/2025/ua88o2000009njje-att/ua88o2000009nk3e.pdf

Expansion of the SUSMICS Series

- Expanding applications of biochar in various construction and civil engineering materials

DAC Coat Mechanism: The Development of the World's First Technology

(Developed in Collaboration with Hokkaido University)



CO_2 Fixation

Amine compounds with high CO_2 absorption capacity are impregnated into concrete

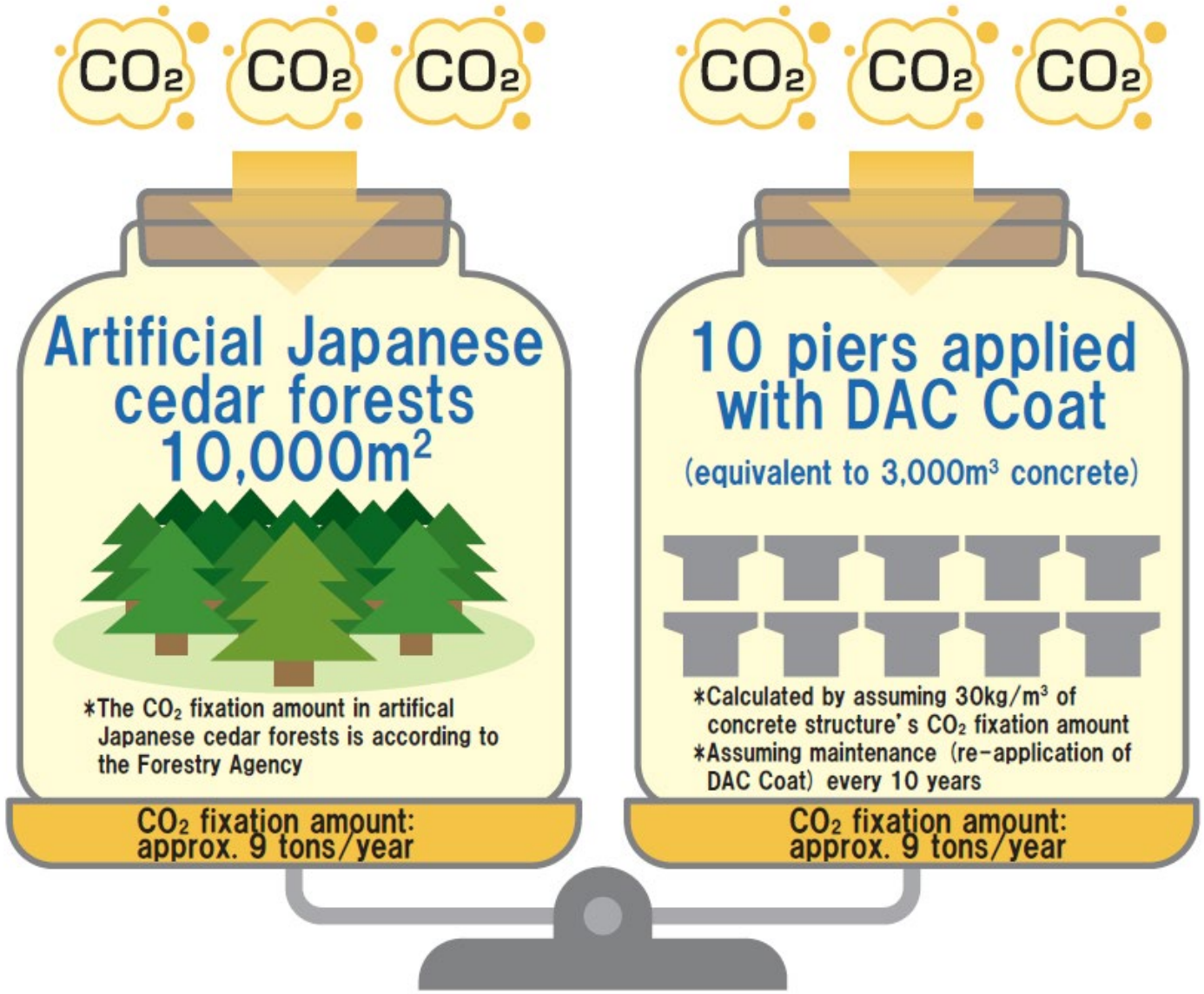
The concrete structure absorbs & fixes atmospheric CO_2

Extended Service Life

Anti-corrosion effect of amines improve the rebar's corrosion resistance

Enhancing the durability of RC structures

The Effects and Benefits



Improving the CO_2 Fixation Amount

1.5 times or more increase

(indoor test results)

Inhibiting the Rebar's Corrosion Rate

Corrosion rate

Approx. 1/50th

Improving the Rebar's Corrosion Resistance

Corrosion resistance

Approx. 1.5 times

DAC Coat Effect Verification

Assessment of CO_2 Absorption Effectiveness in the Field

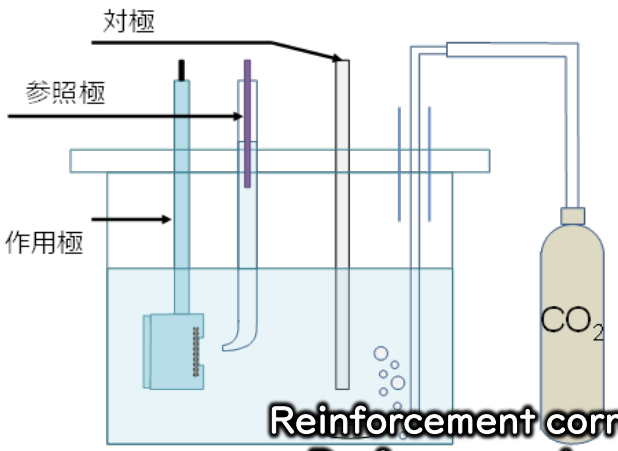
Evaluating 30 types of amine compounds in the field
Approximately 2.5 to 4 times greater CO_2 fixation promotion effect confirmed compared to untreated surfaces

Assessment of Reinforcing Steel Corrosion Protection Performance

Simulating the carbonation environment (pH)inside concrete by bubbling CO_2 gas into $Ca(OH)_2$ solution
Corrosion protection effects confirmed for many amines **in carbonation environments**

Amines exhibiting **high** corrosion resistance **against salts** have also been identified


Assessment of CO_2 Absorption Effectiveness



Reinforcement corrosion protection Performance Assessment Test