



WHITE
CARBON

Development and diffusion of
Carbon Pool Concrete
CO₂ absorption and fixation by concrete

Powered by



RRCS

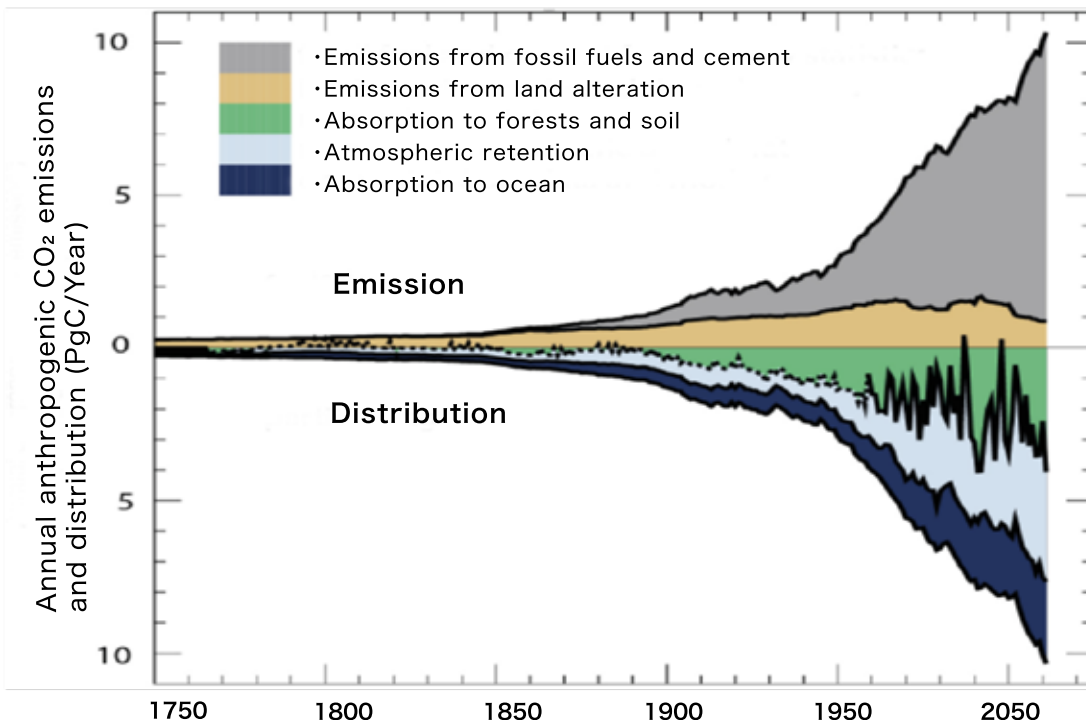
Ready-mixed and Returned Concrete Solution Association

How concrete can contribute to a carbon neutral society

White Carbon is carbon that is emitted by society and gets captured by concrete. In addition to Blue Carbon (from the ocean) and Green Carbon (from land), White Carbon can be the next featured ecosystem.



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Concrete is made by mixing cement, which is produced through a calcination process of limestone at 1400°C or higher with aggregate and water. This process is estimated to emit 300 through 350kg of CO₂ per 1m³, accounting for 8% or more of the annual CO₂ emission on Earth. On the other hand, calcium contained in concrete has the property of taking in CO₂ from the atmosphere, and it is said that up to around 200kg of CO₂ can be fixed per 1m³ of concrete. This ecosystem can be expressed as White Carbon.

It is estimated that 5.83 billion tonnes of CO₂ is taken into the marine ecosystem annually as Blue Carbon, 10.64 billion tonnes of CO₂ taken into the continental ecosystem—Green Carbon, and 1 billion tonnes into White Carbon. Innovation of carbon capture and storage (CCS) and carbon capture, utilisation and storage (CCUS) in the cement and concrete industry has a potential to contribute to a carbon neutral society by reducing CO₂ emissions and utilizing it.

What is Carbon Pool Concrete?



New Energy and Industrial Technology Development Organization

Developing CARBON POOL Concrete with advanced use of CO₂ and implementation in pavements and structures

Contractors

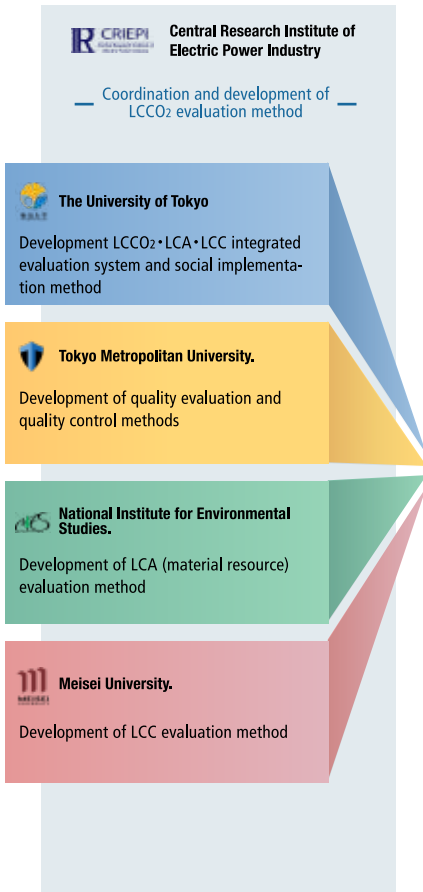
HAZAMA ANDO CORPORATION Taisei Rotec Co., Ltd.
UCHIYAMA ADVANCE Co., Ltd. Osaka Hyogo Concrete Industrial Association
Haiko Onoda Remicon Inc. Central Research Institute of Electric Power Industry

Subcontractors

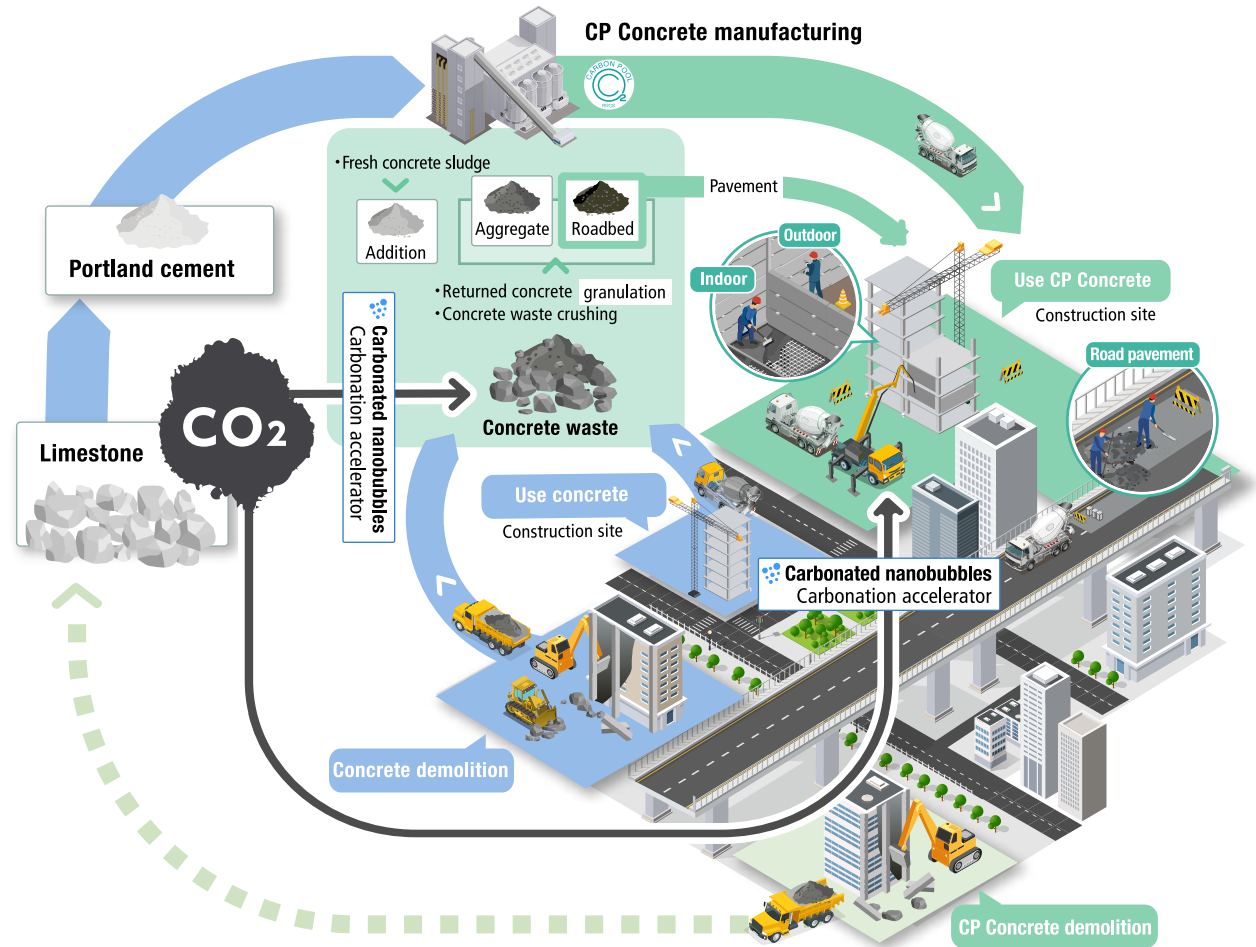
Asunaro Aoki Construction Co., Ltd. ASANUMA CORPORATION THE NIPPON ROAD Co., Ltd.
WATANABE SATO CO., LTD. Topy Industries, Limited. Niigata University.
The University of Tokyo. Tokyo Metropolitan University, National Institute for Environmental Studies Meisei University

The aim of this project is to establish an intra-regional CO₂ cycle by its immobilization by and further to maximize CO₂ fixation and reduction by the time of concrete delivery using new technology. In 2022, this project was adopted as a long-term national project titled "NEDO Green Innovation Fund Project - Project for Development of Concrete Manufacturing Technology Using CO₂" which will take a decade to complete.

● Development of a comprehensive evaluation system for LCCO₂, LCA, and LCC



● Development and implementation of Carbon Pool Concrete



In the future, the dismantling of CP concrete will be used as a raw material for cement by calcining concrete waste.

CP Concrete Project Driving Force

Research and Development

- Regardless of where it's applied (sidewalks, parking lots, driveways, structures), the development of CP Concrete requires new materials and chemicals as well as technologies for highest and fastest CO₂ fixation with nano bubbles.
- Establishment of a mass production system that maintains a optimum porous condition for CP Concrete and maximizes production capacity.
- Developing an innovative non-corrosive reinforcing steel bar that is neither made of stainless steel nor coated with epoxy-resin.

- Support and development of the institutional establishment and business model by increasing the frequency of papers and conference presentations by academics on the relevant research and development, and by increasing exposure in the professional and general media.



Business Model - International

- Along with local commercialization of CP Concrete, promotion of the procurement of CO₂ and other ancillary businesses
- Establishment of joint ventures with local companies for manufacturing and construction

Business Model - Domestic

- Proposal of a scheme to use ESG finance such as green bonds to local governments by forming an alliance with regional banks and securities firms
- Establishment and operation of the CP Concrete Association (manufacturing, construction and quality certification) in Japan
- Establishment of CO₂ procurement method

Institutional Establishment

- Global recognition of CP Concrete's contribution to realization of a sustainable society is essential for the use of ESG finance.
- JIS/ISO standards are realized quickly upon completion of developing a comprehensive evaluation system for LCCO₂, LCA, and LCC.
- Continued efforts to encourage White Carbon to be recognized as an IPCC inventory is needed. Collaboration with domestic and international cement and concrete companies and organizations should be strengthened.

CP Concrete R&D

Carbonated ready-mixed concrete sludge water

- Fixing CO₂ in sludge water by using CO₂ nano bubble water when cleaning agitator tracks.



CO₂ fixed amount
Assuming 10% of sludge water
100kg-CO₂/ton

Carbonated granulated aggregate

- Fixing CO₂ in granulated aggregates by immersing them in CO₂ nano bubble water, etc.



CO₂ fixation
[carbonation of Ca(OH)₂ and C-S-H].
37.8kg-CO₂/ton

Carbonated ready-mixed concrete sludge powder

- Fixing CO₂ in sludge water by using CO₂ nano bubble water when cleaning agitator tracks.



Carbonation of Ca(OH)₂ and C-S-H
Assuming 70% of the maximum fixation
377kg-CO₂/ton

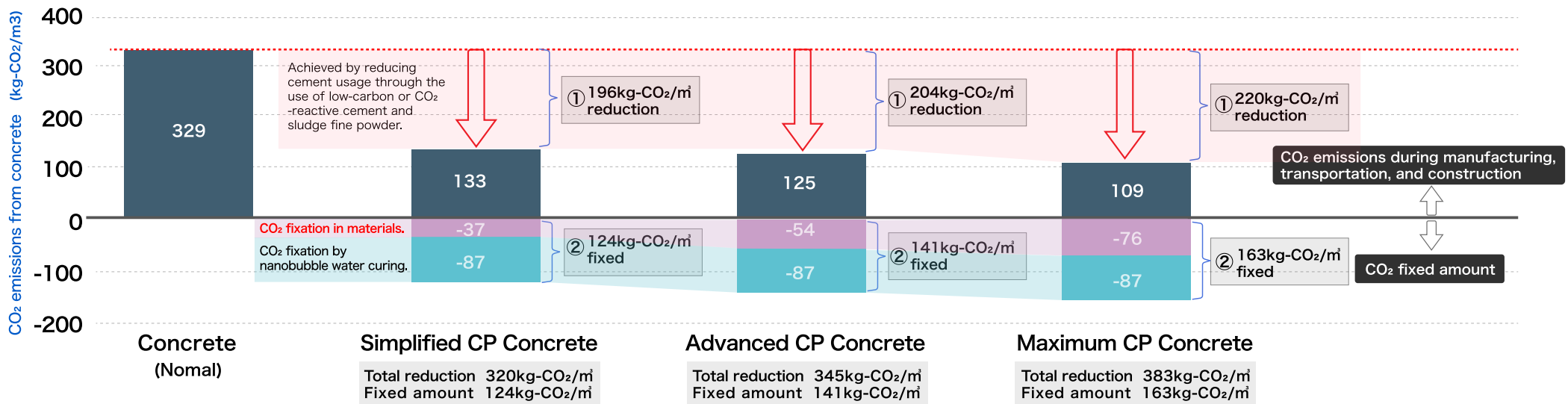
Carbonated recycled aggregate L

- Fixing CO₂ in recycled aggregates L by immersing them in CO₂ nano bubble water, etc.



CO₂ fixation
[carbonation of Ca(OH)₂ and C-S-H].
37.8kg-CO₂/ton

Concrete produced with these materials and low-carbon or CO₂-reactive cement is placed and cured in CO₂ nano bubble water after removal of formwork.



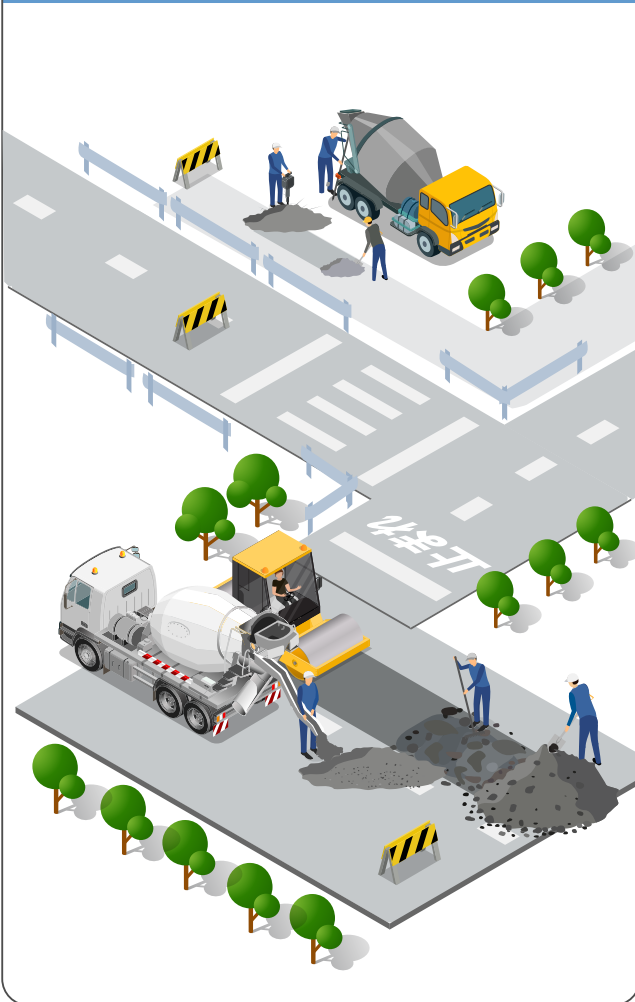
Application of CP Concrete

• Pavement ratio of "asphalt: concrete = 95:5" to "7:3", the same ratio as in other countries.

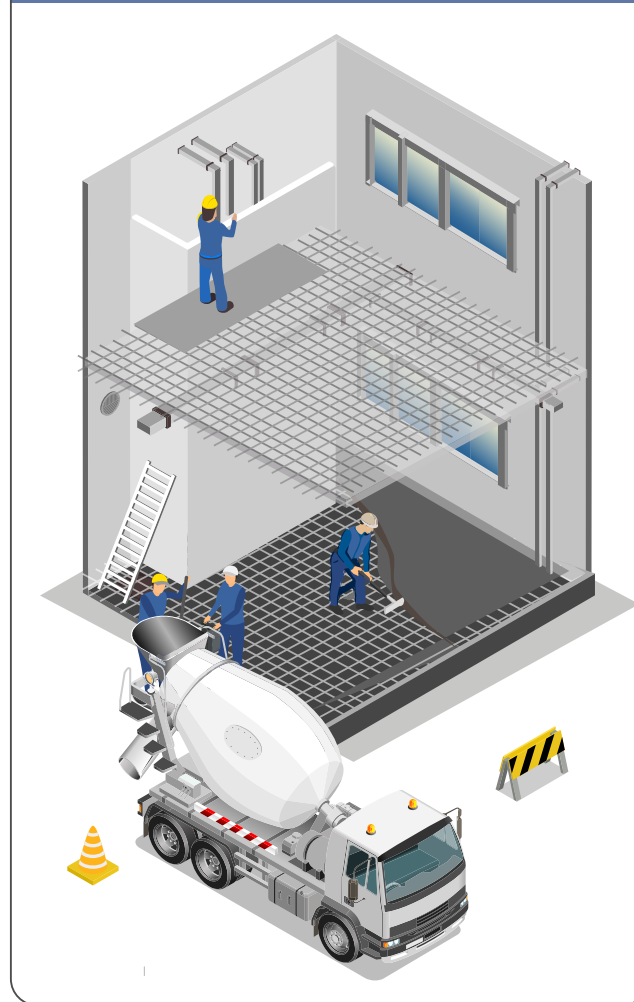
• Rebar corrosion will not occur indoors without moisture

• Developing non-corrosive steel bars for use in exterior walls (including precast concrete)

✓ Paving (sidewalks, parking lots, roads)



✓ Indoor (floor, interior walls)



✓ Exterior walls + corrosion-resistant rebar

