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# Long-term vision of greenhouse gas emissions reduction towards 2050

March 30, 2020

TAIHEIYO CEMENT CORPORATION

# Background

Since the adoption of the Paris Agreement at the 21<sup>st</sup> Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) in 2015, active discussions have been underway in Japan and other countries toward realizing a carbon-free society.

Taiheiyo Cement is committed to reducing CO<sub>2</sub> emissions by various countermeasures such as the introduction of energy-efficiency equipment, energy consumption reduction due to stable and efficient operation of cement kilns, and replacing fossil fuels with alternative energy derived from waste and biomass.

In addition, we have been experimentally demonstrating CO<sub>2</sub> capture from kiln exhaust gas at our Fujiwara Plant since 2018 in order to establish the technical foundation for CO<sub>2</sub> capture.

Further to the announcement of Taiheiyo Cement's long-term vision in July 2019, we have formulated specific measures for greenhouse gas (GHG) emissions reduction towards 2050.

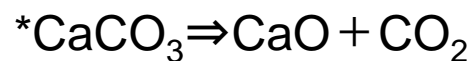
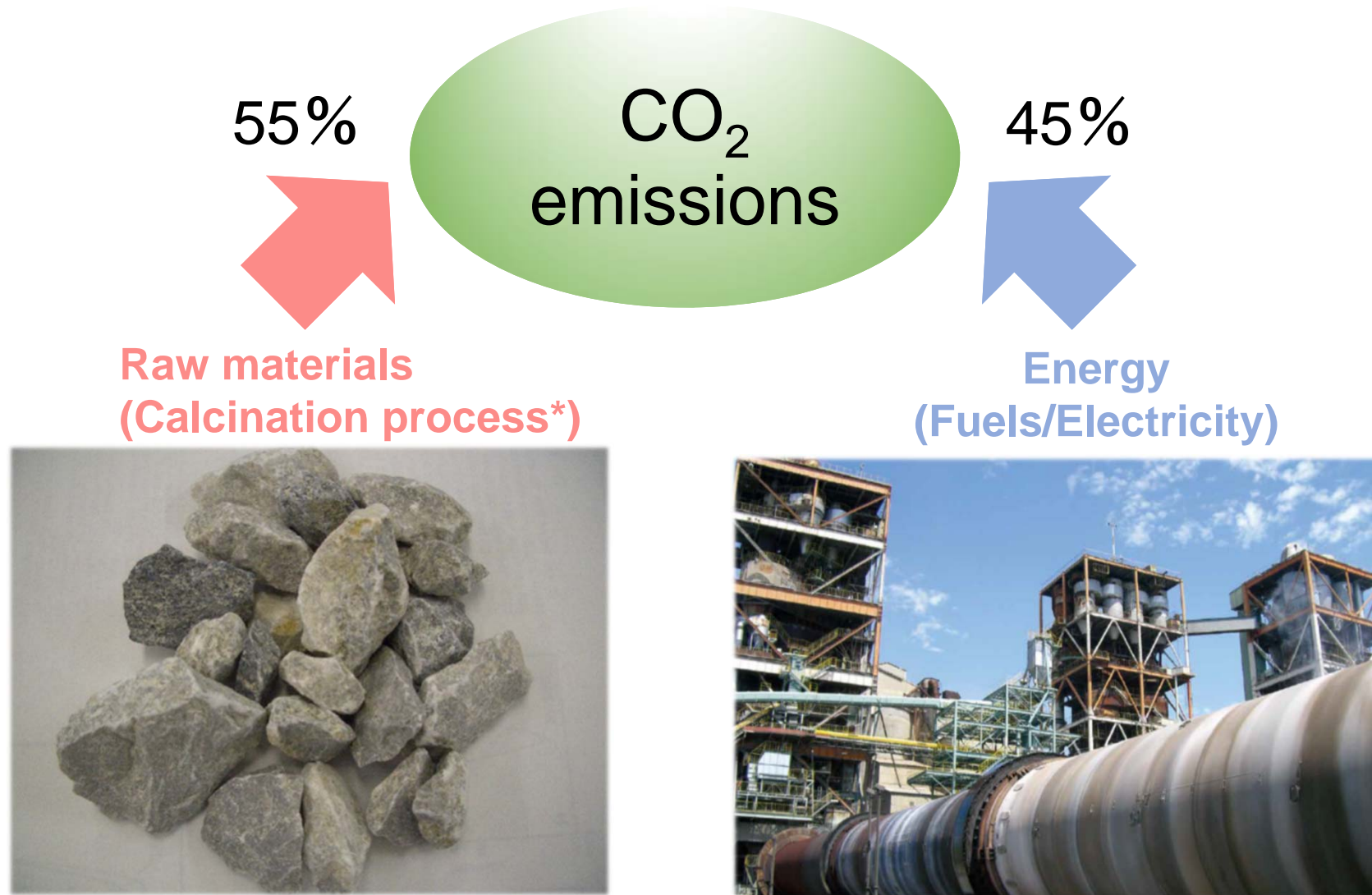
# Taiheiyo Cement Group Mission and long-term vision towards 2050

## Mission of the Taiheiyo Cement Group

**“Our mission is to contribute to social infrastructure development by providing solutions that are environmentally efficient, enhance our competitive position and bring value to our stakeholders.”**

- Based on our mission, we are positioning global warming countermeasures as our growth strategy.
- In order to contribute to a resource recycling-based society, we will reduce CO<sub>2</sub> emissions whilst maintaining cement production volumes and expanding the use of wastes and by-products.

# CO<sub>2</sub> emissions from cement production



# Framework of our long-term vision

Reduction of specific net CO<sub>2</sub> emissions<sup>\*1\*3</sup> from cement production

Our goal is to achieve an **80%** reduction of CO<sub>2</sub> emissions by 2050

Raw material related CO<sub>2</sub> reduction

Low-CO<sub>2</sub> clinker/cement, SCMs (Supplementary Cementitious Materials)

Energy related CO<sub>2</sub> reduction

Alternative energy, Low CO<sub>2</sub> energy



Innovative technologies for CO<sub>2</sub> reduction

CO<sub>2</sub> capture, utilization and storage

Avoided CO<sub>2</sub> emissions<sup>\*2\*3</sup> throughout the value chain

Our goal is to avoid **20%** of CO<sub>2</sub> emissions by 2050

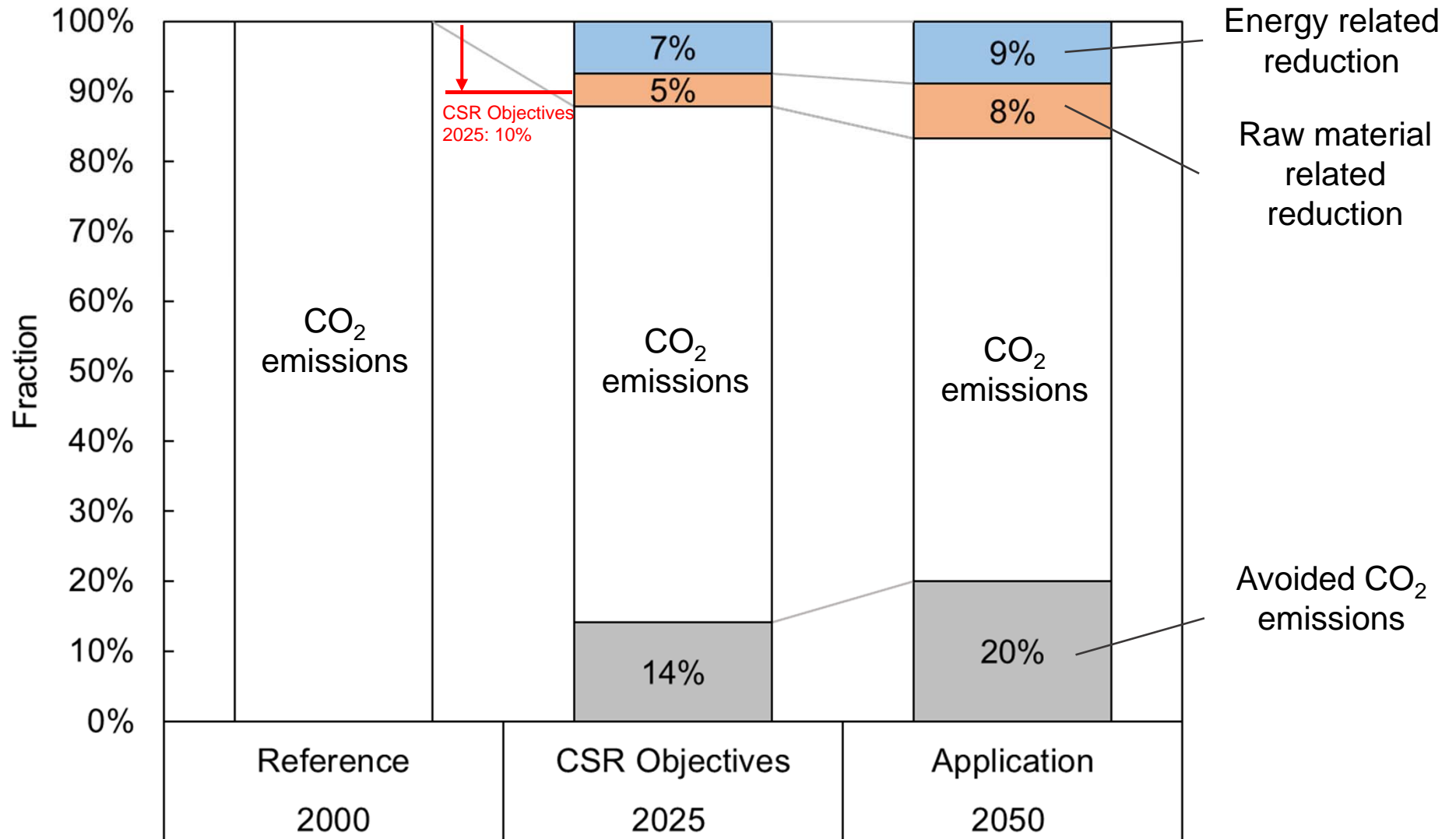
Avoided CO<sub>2</sub> emissions throughout the global value chain related to our products and operations

- \*1 Specific net CO<sub>2</sub> emissions:  
The ratio of CO<sub>2</sub> emissions from cement production excluding CO<sub>2</sub> emissions from alternative energy.
- \*2 Avoided CO<sub>2</sub> emissions:  
CO<sub>2</sub> emissions reduction except for process and energy related CO<sub>2</sub> reduction in cement production.
- \*3 Reference year: 2000  
Scope: Taiheiyo Cement Group

# Scenarios for CO<sub>2</sub> emissions reduction in cement production

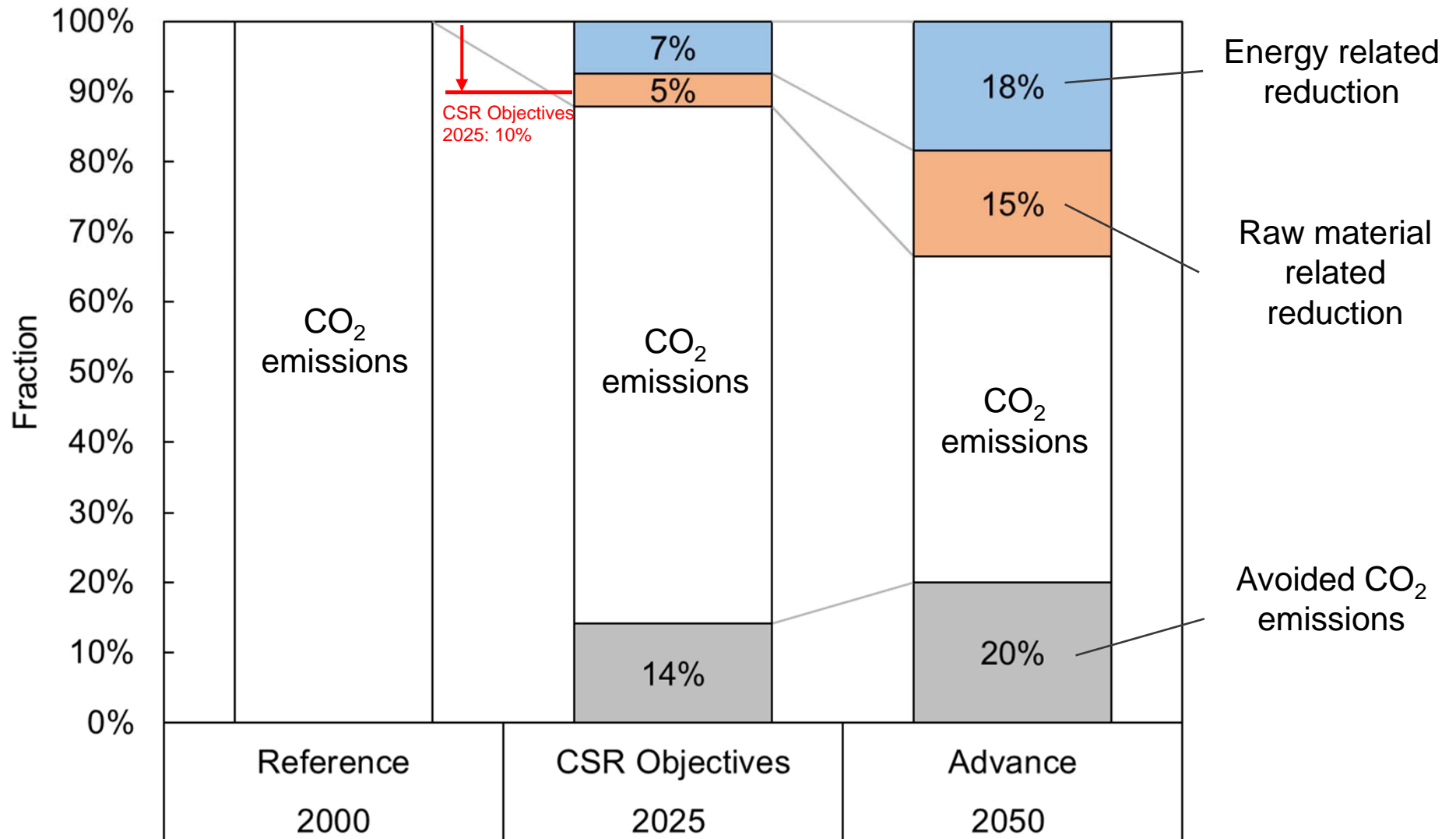
- **Application scenario: application of existing technologies**
  - Energy related measures: introduction of energy-efficient equipment, use of alternative energy sources.
  - Process related measures: design of low-CO<sub>2</sub> cement (improvement of clinker, use of SCMs) within the current standards.
- **Advance scenario: introduction of new technologies**
  - Energy related measures: use of low-carbon energy (LNG, etc.), increased use of alternative energy sources.
  - Process related measures: design and development of low-CO<sub>2</sub> cement with associated revision of cement standards.
- **Innovation scenario: introduction of innovative technologies**
  - Energy related measures: utilization of energy sources derived from captured CO<sub>2</sub>.
  - Process related measures: design and development of low-CO<sub>2</sub> cement using new materials.
  - Innovative technologies: CO<sub>2</sub> capture, utilization and storage technology applicable for cement production.

# Application scenario



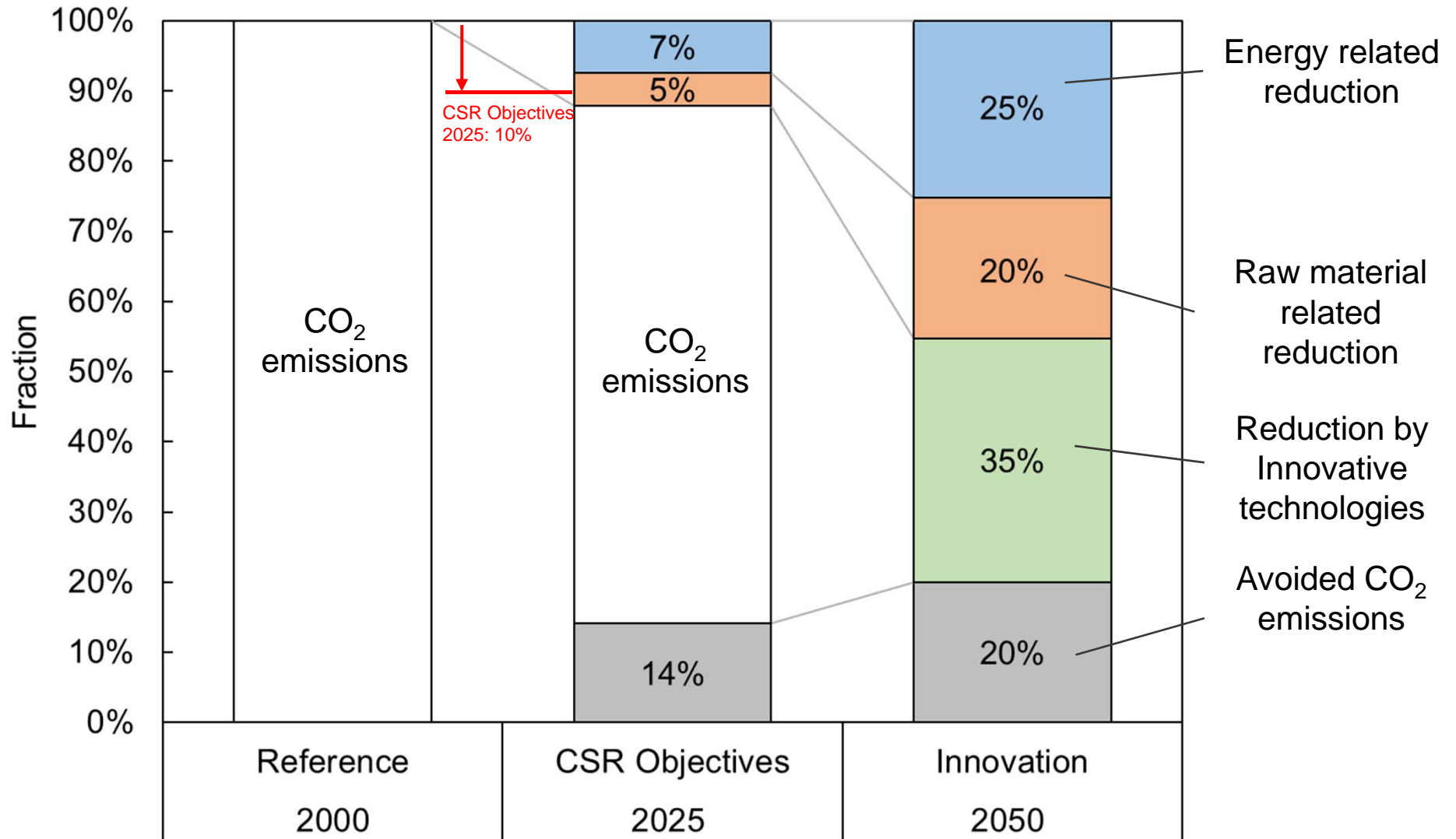
\*The avoided CO<sub>2</sub> emissions throughout the value chain of our products and operations doesn't reduce CO<sub>2</sub> emissions in cement production but is shown in the same figure for convenience.

# Advance scenario



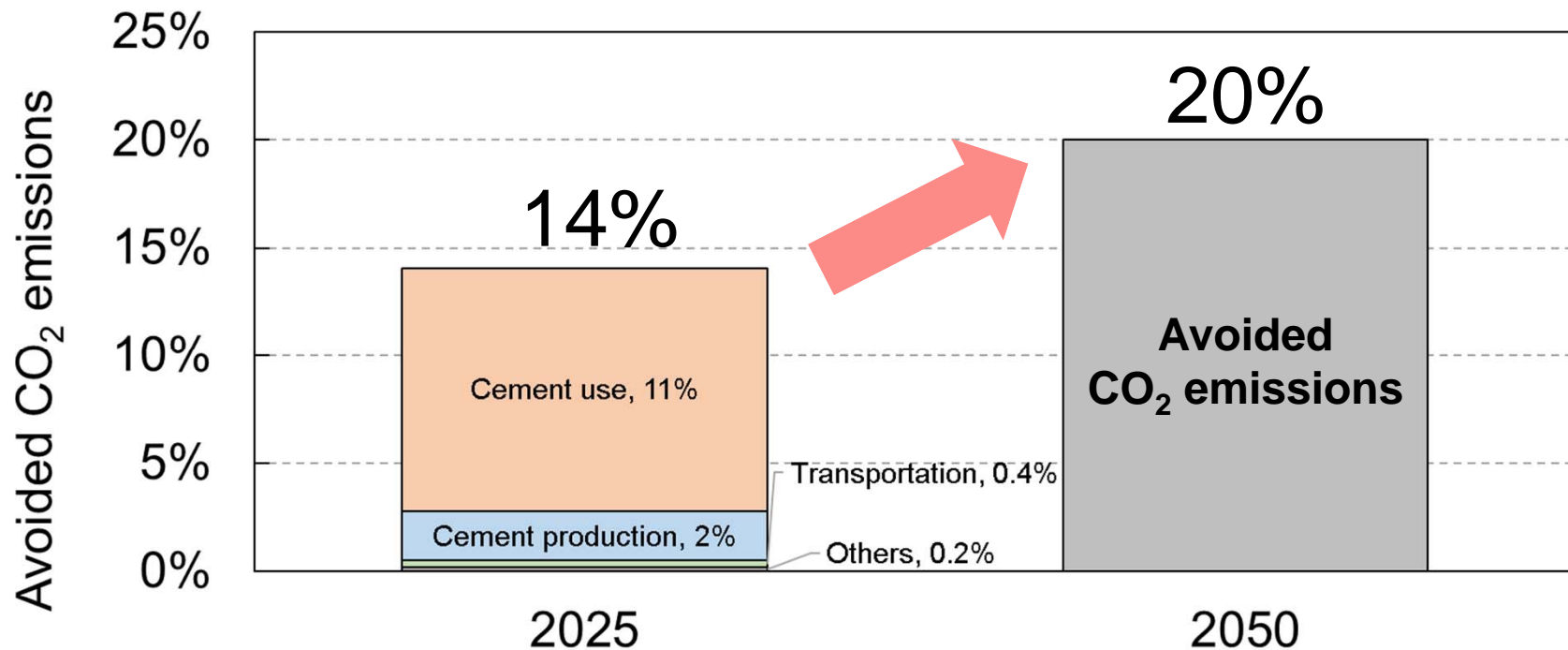


# Innovation scenario

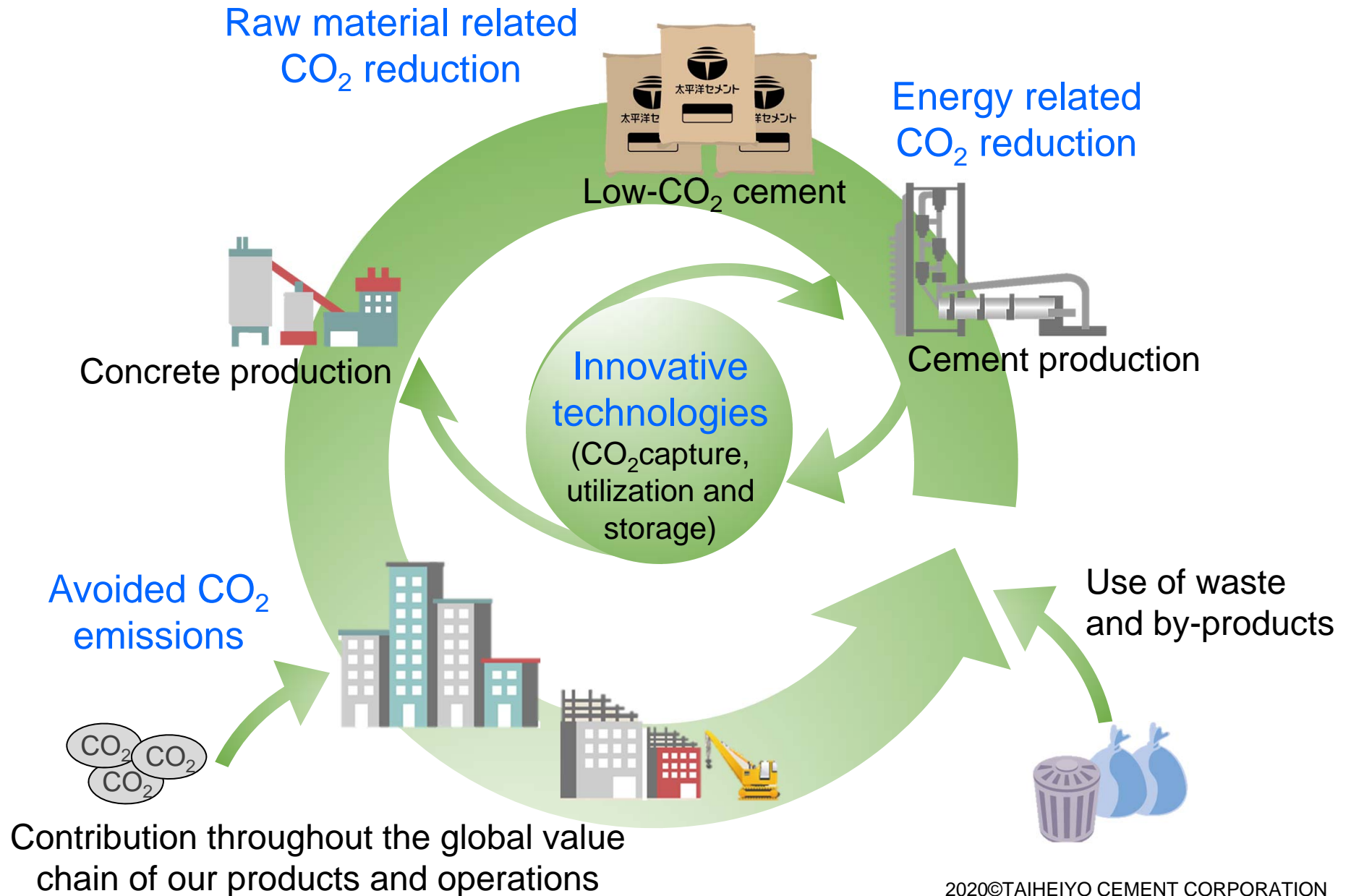


# Avoided CO<sub>2</sub> emissions scenario

Value chain	Scenario (measures, technology)
Cement use stage	Development of concrete technology contributing to avoided CO <sub>2</sub> emissions / Evaluation of CO <sub>2</sub> uptake by recarbonation during concrete life-cycle
Cement production stage	Operation of biomass power generation systems and waste heat power generation systems
Transport stage	Promotion and introduction of energy-efficiency equipment, technology, etc. in the transportation of raw materials, fuels and products
Others	Development and operations of measures and products related to CO <sub>2</sub> uptake such as biodiversity conservation, algal growth technology, etc.



# Future vision of our operations



# Conclusions

In order to realize the long-term goal of an 80% reduction in GHG emissions by 2050, we need to develop innovative technologies as well as to advance the application and development of existing technologies. There are also tough issues beyond the technical aspects, such as social acceptance and sharing of financial burden. Looking to our growth and new societal changes in the future, our efforts will focus on **the long-term vision** positioned as **the goal to be achieved by the whole Taiheiyo Cement Group.**