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A framework formulated for our long-range vision of greenhouse gas emissions reduction toward 2050

Taiheiyo Cement Corporation ("Taiheiyo Cement") has formulated a framework for its long-range vision of greenhouse gas emissions reduction with a goal of achieving an 80% reduction by 2050.

Since the adoption of the Paris Agreement at the 21st 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 to further reduce greenhouse gas (CO_2, hereafter) emissions. We at Taiheiyo Cement have positioned CO_2 emissions reduction as an important growth strategy and, in 2017, set up an in-house cross-divisional organization to study the issue from a long-term and strategic perspective. Our focuses include introducing energy-saving equipment and making kiln operation more stable and efficient for less energy consumption, and reducing fossil energy use through increased use of waste- and biomass-derived energy. In addition, we are aiming to develop a kiln gas CO_2 capture technology which enables a massive reduction of CO_2 emissions and started a demonstration test for its verification at our Fujiwara Plant in 2018. As a part of these activities, a framework has been formulated for our long-range vision of CO_2 reduction toward the year 2050.

Framework for the long-range vision of Taiheiyo Cement

(1) Reduction of CO_2 emissions in cement production

(long-term goal: 80% reduction by 2050)

(2) Contribution of cement products to avoided CO_2 emissions

(long-term goal: contribution to avoided emissions equivalent to 20% of the CO_2 emissions in cement production)

The main pillar of the framework for the long-range vision is the reduction of CO_2 emissions in cement production, with a long-term goal of an 80% reduction by 2050 to meet the long-term objectives of the Plan for Global Warming Countermeasures adopted by the Japanese Cabinet in 2016. The other important pillar comprising the framework is the contribution of cement products to avoided CO_2 emissions.

In order to realize the long-range vision, the outline of technical measures has been formulated as follows:

- Increased use of the alternatives to fossil energy;
- Increased use of fossil energy which generates less CO_2 emissions;
- Development of low-carbon clinkers and cements, including those with higher admixture contents;
- CO_2 Capture from exhaust gases, and effective use and storage of the captured CO_2.

Many of the above require innovative approaches which cannot be achieved by simply extending the currently available technologies or social environments. There are also other issues beyond the technical aspects, such as development of codes and standards, social acceptance, and sharing of financial burden. While solving these challenges, we will continue our efforts to realize the long-range vision, with a view to our future growth as well as major social changes. Furthermore, a new dedicated organization will be established within the Central Research Laboratory to strengthen research and development of the technical measures including carbon recycling (effective use of CO_2).

More specific content of the long-range vision currently under development will be released as completed.

For the second pillar of the framework for the long-range vision, research for quantification of the contribution of cement products to avoided CO_2 emissions was started in 2017, and the Calculation and Reporting Protocol for Accounting and Reporting of Avoided GHG Emissions through the Value Chain of Cement and Cement-based Products was finalized in 2018 (see Attachment).

Manufactured cement, which is mainly used in concrete for structures and buildings, has the feature of uptaking and fixing CO_2 present in the atmosphere while the structures or buildings are in service or subsequent demolishing.

The Protocol specifies how to calculate the CO_2 absorption capacity. According to the calculation based on the Protocol, the amount of CO_2 absorption by the cement produced in 2017 is estimated to be about 2 million tons for the products of Taiheiyo Cement Corporation (inside Japan) or about 2.8 million tons for the products of the entire Taiheiyo Cement Group (inside and outside Japan), which is equivalent to 17% or 12%, respectively, of the amount of CO_2 emissions in cement production. Our study will continue for further enhanced contribution to avoided emissions.

With the aim of leading the way to a sustainable global future, "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" .

[Attachment]

Formulation of the protocol for calculating the amount of contribution of cement-related products to avoided CO_2 emissions, and the amount of CO_2 absorption by the cement produced by Taiheiyo Cement

The Calculation and Reporting Protocol for Accounting and Reporting of Avoided GHG Emissions through the Value Chain of Cement and Cement-based Products has been formulated to enable quantification and visualization of the contribution of cement products to avoided CO_2 emissions in the framework for the long-range vision. Using the Protocol, we can quantify the contribution of cement to avoided CO_2 emissions in the whole life cycle from raw materials procurement and manufacturing in the production process to use in concrete or other products and disposal.

Manufactured cement, which is mainly used in concrete for structures and buildings, has the feature of uptaking and fixing CO_2 present in the atmosphere while the structures or buildings are in service or subsequent demolishing.

The Protocol specifies how to calculate the CO_2 absorption capacity by the cement produced in the whole life cycle.

According to the calculation, the lifetime CO_2 absorption capacity of the cement produced in 2017 is estimated to be about 2 million tons for the products of Taiheiyo Cement Corporation (inside Japan) or about 2.8 million tons for the products of the entire Taiheiyo Cement Group (inside and outside Japan), which constitutes no small contribution.

The estimated CO_2 absorption capacity is equivalent to 17% or 12%, respectively, of the amount of GHG emissions in cement production of about 17 million tons by Taiheiyo Cement Corporation (inside Japan) or about 33 million tons by the entire Taiheiyo Cement Group (inside and outside Japan) in 2017.

The formulation of the Protocol and the calculation of the CO_2 absorption capacity of cement have been conducted through the exchange of ideas with external expertise from an environmental management consulting company and finalized after a third-party review by Lloyd's Register Quality Assurance Limited, an external certification body. The Protocol will be released on our website in the near future.

Through the Protocol, Taiheiyo Cement will provide and develop products that will contribute to the enhanced contribution of cement products to avoided CO_2 emissions in the long-range vision.