### Column

# Why are CE and CN important to the Taiheiyo Cement Group?

#### Please read right to left.





| Well done! OK then<br>What about circular economies? | Gulp! | Uh-huh!! |
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## Circular Economies and Taiheiyo Cement's Initiatives

A circular economy (CE) is an economic system that circulates resources by reusing waste, aiming for the sustainable use of resources and environmental protection. Leveraging the characteristics of the cement manufacturing process, our company utilizes various waste and by-products as raw materials and fuel.

This is possible because the main chemical components of cement are CaO (calcium), SiO<sub>2</sub> (silica), Al<sub>2</sub>O<sub>3</sub> (alumina), and Fe<sub>2</sub>O<sub>3</sub> (iron), and cement can still be produced even when the conventionally used raw materials are replaced by various wastes containing these components. Taking advantage of these characteristics of cement, we use many wastes and byproducts in cement production, including for fuel substitution, thereby contributing to the realization of CE through the effective utilization of resources and the extension of the lifespan of final disposal sites.

In March 2025, we held a "Sustainability Briefing" and explained our CN and CE initiatives to investors and financial professionals.

## Amount and Intensity of Main Waste and By-products Used (FY2025)

| and By-products Used (FY2025)               |                 | Non-consolidated            |  |
|---|-----------------|-----------------------------|--|
| Waste and By-products                       | Amount used (t) | Basic unit<br>(kg/t-cement) |  |
| Coal ash                                    | 1,779,387       | 135.1                       |  |
| Blast furnace slag                          | 969,035         | 73.6                        |  |
| By-product gypsum                           | 453,980         | 34.5                        |  |
| Unburned ash, dust                          | 378,187         | 28.7                        |  |
| Dirt and sludge                             | 378,187         | 28.7                        |  |
| Construction soil                           | 146,528         | 11.1                        |  |
| Waste oil                                   | 178,159         | 13.5                        |  |
| Wood chips                                  | 12,705          | 1.0                         |  |
| Waste plastic                               | 232,558         | 17.7                        |  |
| Water treatment plant sewage sludge and ash | 306,995         | 23.3                        |  |
| Municipal waste incineration ash            | 137,123         | 10.4                        |  |
| Municipal waste                             | 14,074          | 1.1                         |  |
| Other                                       | 449,836         | 34.0                        |  |
| Total                                       | 5,436,755       | 412.6                       |  |
| Raw material-related waste                  | 5,013,333       | 380.5                       |  |
| Fuel-related waste                          | 423,422         | 32.1                        |  |
| Total                                       | 5,436,755       | 412.6                       |  |

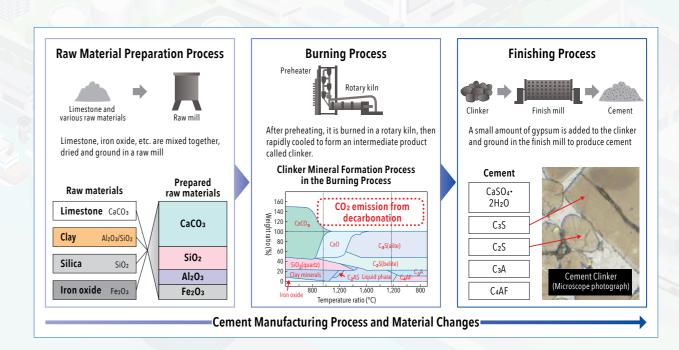
| Main chemical componen<br>(required component)   |              |     | Main raw materials  | Substitutes (examples)               |
|--|--------------|-----|---|--------------------------------------|
|  | <del>-</del> | 4   | Limestone (CaO source)  | Ready-mixed concrete sludge          |
| Calcium oxide (CaO)                              | 63~65%       |     |   | Coal ash, slag, incineration ash,    |
| Silicon dioxide (SiO2)                           | 20~23%       |     | Clay (SiO <sub>2</sub> , Al <sub>2</sub> O <sub>3</sub> source) | construction soil, sludge            |
| Aluminum oxide (Al <sub>2</sub> O <sub>3</sub> ) | 4~6%         |     | Silica (SiO₂ source)  | Molding sand, waste glass            |
| Iron oxide (Fe2O3)                               | 2~4%         | ◀—— | Iron oxide (Fe <sub>2</sub> O <sub>3</sub> source)              | Blast furnace dust, non-ferrous slag |

#### **Cement Manufacturing, CE, and CN**

The cement manufacturing process is divided into three stages, as shown from the left in the diagram below: the raw material preparation process, the burning process, and the finishing process.

In the first "raw material preparation process", waste and by-products are ground in appropriate proportions along with natural raw materials such as limestone and silica stone to create the prepared raw materials. In the central "Burning Process", the prepared raw materials pass through a preheater and are then burned in the rotary kiln. As the temperature rises, the raw materials undergo chemical changes and transform into clinker minerals such as alite (C3S) and belite (C2S). Also, during this burning process, raw material-derived CO2 is emitted due to the decarbonation of limestone. Since fossil energy is used to maintain these high temperatures, energy-derived CO2 is also generated. The generation of CO2 in this burning process is unavoidable for the cement industry due to the nature of the manufacturing process, and reducing it as much as possible, or capturing it for utilization and storage, is an important challenge for our group's carbon neutrality strategy.

In the final "finishing process", the product, Portland cement, is manufactured by grinding the clinker obtained in the "burning process" while adding a small amount of gypsum (CaSO<sub>4</sub>·2H<sub>2</sub>O).



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