E Environment

Environmental Management

Relevant SDGs

Environmental Management Policy

Our environmental management policy declares an active commitment to environmental issues facing society, including not only preventing environmental pollution but also creating a recycling-based society, mitigating climate change, reducing environmental impacts, protecting water resources and conserving biodiversity as key management challenges. Under this policy we are focusing on improving our environmental performance.

Environmental Management Policy

In January 2006 we formulated an Environmental Management Policy, reflecting the fact that we consider an active commitment to the environmental issues facing society to be key management challenges. In addition to initiatives emphasizing these six items in all business operations, we strive to communicate with a wide range of stakeholders, from international society to local communities, and to seek the ideal form for a sustainable cement industry as a member of the WBCSD and GCCA (Global Cement and Concrete Association).

Formulated in January 2006
Revised in April 2019

1. **Pursuing Environmentally Conscious Business Activities**
   In pursuit of reducing environmental impacts, we properly assess the impacts of our business activities and promote the introduction of eco-efficient technologies into our business and the development of eco-conscious products. Also, we pursue environmental conservation activities as a member of the regional community.
2. **Compliance with Environmental Laws and Regulations**
   As a minimum, we comply with all environmental laws and regulations applicable to our business activities. Furthermore, beyond compliance, we meet environmental commitments undertaken through voluntary agreements.
3. **Contributing to a Recycling-based Society**
   Leveraging the inherent capabilities of the cement industry, we actively recycle industrial and municipal waste as raw materials and fuels for cement production.
4. **Proactively Addressing the Issue of Climate Change**
   We promote greater energy reduction throughout the whole of our business activities and strive to develop technology to help reduce society's total greenhouse gas emissions.
5. **Promoting Global Technology Transfer**
   Through the worldwide transfer and deployment of our technology, we aid the development of greater energy conservation, environmental preservation and utilization of waste materials.
6. **Ecosystem Conservation**
   We strive to protect the ecosystem, including biodiversity, by providing products and technologies that contribute to harmonious coexistence with nature.

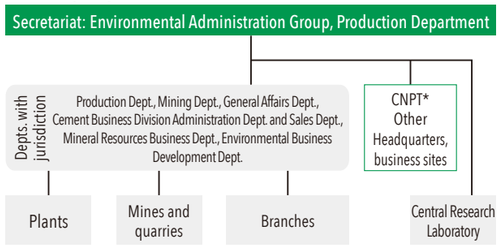
Company-wide Environmental Management System (EMS)

In June 1997 we initiated ISO 14001 certification of each of our plants and attained certification of all six of our directly operated plants by 1999. Recognizing, however, that plant level management systems alone are insufficient to ensure comprehensive environmental protection through environmental management projects, we built a company-wide environmental management system (EMS) and extended it beyond plants to cover our headquarters, branches and Central Research Laboratory. In April 2009 our EMS was ISO 14001 certified by the Japan Testing Center for Construction Materials, an independent third-party testing, standardization and certification authority. As part of the continuing certification, the company-wide system underwent a renewal audit for the fourth time in March 2021.

EMS Readiness

Top management (the officer in charge of the Production Department) chairs the Environmental Management Committee with ultimate decision-making authority for environmental management. Overseen by the Environmental Management Committee, the relevant headquarters division manages our plants, mines, quarries and branches using an "umbrella" system.

● Company-wide EMS Readiness



*The Carbon Neutral Technology Development Project Team

● Taiheiyo Cement Group Environmental Targets GCCA

CO_2 Emission Reduction Targets

Cement production-related CO_2 emissions from Taiheiyo Cement and group companies

Reduce specific net CO_2 emissions by 10% or more from FY2001 levels by FY2026. CSR Objectives for 2025

Reduction Target for Main Air Pollutants

Emissions of NOx, SOx and dust from the main stacks of kilns at the cement production sites of Taiheiyo Cement and group companies

Limit NOx, SOx and dust levels per tonne of clinker (g/t-clinker) to the target levels achieved in FY2011

All of our cement plants in Japan, including those of group companies, have obtained ISO 14001 certification. Furthermore, all of our overseas cement plants in countries that adopt ISO have obtained ISO 14001 certification and are actively committed to environmental conservation. Cement plants in countries where ISO is not adopted as the mainstream standard operate their own EMS.

Internal Environmental Audits

We conducted internal environmental audits at all our sites in FY2021.

As priority items from this year's audit, confirmation of legal compliance reviews, external communications and corrective actions for unachieved items were identified as company-wide concerns. The status of a follow-up, including corrective and preventive actions for nonconformity with environmental requirements, and the status of responses to emergencies were identified as items that plants must deal with. Verifying the compliance status of service stations was identified as an item that must be dealt with by branches.

The audit identified 34 findings, including 3 for which improvements were requested. Corrective actions were taken for all 3 findings for which improvements were requested.

Environmental Education

During Environment Month each June we deliver a message from the president and provide educational materials on the environment page of our portal site to increase awareness and encourage learning about the environment, and about environmental preservation activities throughout the group. Each workplace also engages in a number of different activities, such as conducting training sessions related to accident response, viewing environment-related videos, holding lectures and taking part in local cleanup activities. In FY2021, more than 400 activities took place, including group companies' activities.

Training to respond to environmental accidents (Kumagaya Plant)

Compliance with Environmental Laws

▶ GRI307-1

Environmental Accidents

In FY2021, we had no legal or regulatory violations related to the environment that were subject to fines or penalties, or any significant accidents that affected the environment or ecosystems. However, we had three minor accidents and took measures to prevent their recurrence.

Response to Environmental Accidents

Each plant maintains emergency response plans in preparation for possible environmental accidents. They also conduct periodic fire-fighting drills in cooperation with local fire departments. Other training includes how to reduce environmental impact when an environmental accident occurs, and how to report it to a government entity.

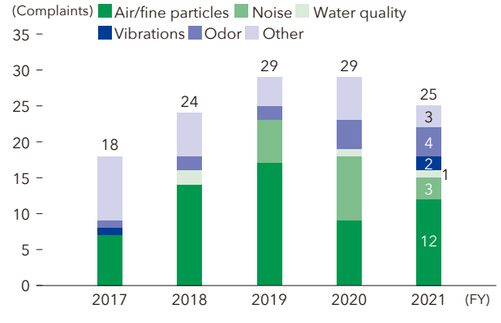
Environmental Complaints

As we increasingly utilize ever more diverse forms of waste and by-products the number of environmental issues we need to consider also increases. Therefore, we are ramping up our efforts to reduce environmental impact through activities such as introducing indoor storage and sealed containers for waste and by-products, and improving our flue gas stacks. On receiving an environmental complaint, whenever possible we quickly travel to the site in question to check the situation, investigate the cause and provide an explanation. If we find that our activities are the cause we implement improvements.

In FY2021, our cement plants received 109 environmental complaints, including those from outside sources. We responded to 25 of these, which were associated with our operations. The number of complaints has remained roughly the same since FY2018.

● Number of Environmental Complaints Received

Non-consolidated



Mitigating Climate Change

Relevant SDGs

Greenhouse Gas Emissions and Achievement of Our CSR Objectives for 2025

▶ **GRI102-11, 302-3, 305-1, 2, 4, 5**

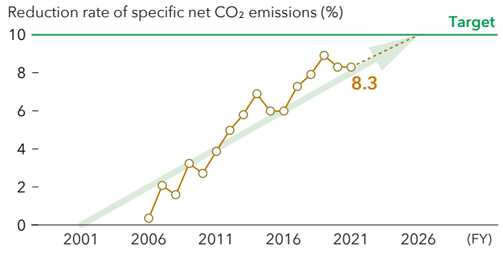
Among the total greenhouse gas emissions generated by our domestic group companies (excluding power generation companies) that are reporting their greenhouse gas emissions by business segment in accordance with the Act on Promotion of Global Warming Countermeasures, about 95% of greenhouse gas emissions were generated from cement production companies in FY2017.* Roughly 5% of our Scope 1 and 2 emissions were associated with our service stations, headquarters, branches and shipping, as well as electricity purchased by the group. Our Scope 3 emissions, calculated according to categories 1, 3, 4, 6 and 7 of the WBCSD/CSI Scope 3 guidelines, were roughly 4% of our Scope 1 and 2 emissions.

The bulk of greenhouse gas emissions associated with the operations of our group companies are directly associated with cement production. We have therefore set in the CSR Objectives for 2025 a medium to long-term quantitative target of reducing specific net CO_2 emissions by 10% or more from FY2001 levels.

Some of our plants are taking part in the target setting type emissions trading program for Saitama Prefecture and California's cap-and-trade program, and striving to achieve the reduction targets. To support voluntary approaches we are also working in line with Keidanren's voluntary action plan and the measures to reduce greenhouse gas emissions established by the WBCSD and GCCA.

* Most of our overseas group companies are cement production companies, so the ratio of cement production companies in our overall CO_2 emissions fromproduction is higher than it would be for domestic companies alone.

● Progress in Meeting the CO_2 Reduction Targets in CSR Objectives for 2025



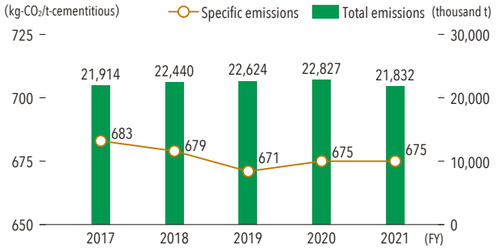
Efforts Related to the Cement Production Process

▶ **GRI302-1, 3, 4, 305-4, 5**

A significant amount of CO_2 is generated during cement production. This is because the production process requires a high temperature of 1,450°C and limestone, used as a raw material, is decarbonated through a chemical reaction during the calcination process ($CaCO_3 \rightarrow CaO + CO_2$). About 35% of CO_2 emissions generated during cement production are from the consumption of energy, about 55% are from the calcination of raw materials, and about 10% are from electricity use. In order to reduce CO_2 emissions we have been working to conserve energy by installing energy-efficient equipment and improving the stability and efficiency of our kiln operations. We have also been implementing measures such as expanded use of waste- and biomass-derived energy sources to decrease our rate of use of fossil fuels. We are also moving toward using recycled resources with less carbonate content to lower CO_2 emissions from the calcination of limestone. We are moving forward with the adoption of waste heat power generation to reduce CO_2 from electric power.

Our specific net CO_2 emissions for FY2021 were 675 kg of CO_2 per tonne of cementitious product, the same as in FY2020.

● Specific Net CO_2 Emissions GCCA

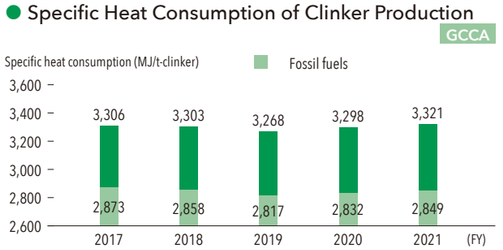


Reference guidelines: "GCCA Sustainability Guidelines for the monitoring and reporting of CO_2 emissions from cement manufacturing Ver. 0.1" GCCA

Efforts to Save Energy

Specific heat consumption of clinker production by the group's cement plants in FY2021 was 3,321 MJ/t-clinker, a 23 MJ/t-clinker increase on the previous year's level.

● Specific Heat Consumption of Clinker Production GCCA

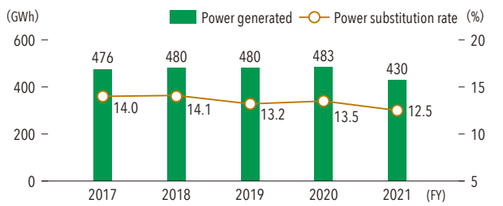


Reference guidelines: "GCCA Sustainability Guidelines for the monitoring and reporting of CO_2 emissions from cement manufacturing Ver. 0.1" GCCA

Waste Heat Power Generation

Waste heat power generation associated with the group's cement production was 430 GWh in FY2021, a roughly 53GWh decrease on FY2020. Its ratio to all electricity consumed at our cement plants was about 12.5%. Assuming an emission factor of 0.69 t-CO_2/MWh if we were to purchase electric power from an external source, this works out as a reduction in CO_2 emissions of approximately 297 thousand tonnes.

● Electricity Generated by Waste Heat GCCA

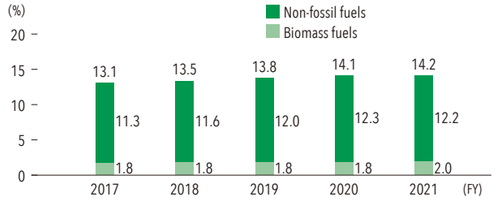


Reference guidelines: "GCCA Sustainability Guidelines for the monitoring and reporting of CO_2 emissions from cement manufacturing Ver. 0.1" GCCA

Alternative Energy Resources and Alternative Raw Materials

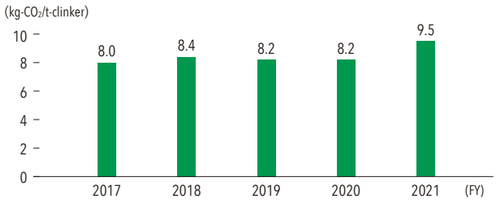
In FY2021, non-fossil energy and biomass energy accounted for about 14.2% of all energy used for group kilns. A decrease in CO_2 emissions of about 9.5kg-CO_2/t-clinker was also achieved by using alternative raw materials instead of limestone. Assuming an emission factor of 0.096 kg-CO_2/MJ for coal, our use of alternative energy resources alternative raw materials works out as a reduction in CO_2 emissions of approximately 1.47 million tonnes.

● Ratio of Alternative Fuels and Biomass Fuels GCCA



Reference guidelines: "GCCA Sustainability Guidelines for the monitoring and reporting of CO_2 emissions from cement manufacturing Ver. 0.1" GCCA

● Reduction of Specific CO_2 Emissions by Replacing Limestone with Alternative Raw Materials GCCA



Reference guidelines: "GCCA Sustainability Guidelines for the monitoring and reporting of CO_2 emissions from cement manufacturing Ver. 0.1" GCCA

Reducing CO_2 Emissions during Transportation

▶ **GRI305-3**

We contract the delivery of our raw materials and products to transportation companies and are striving to reduce CO_2 emissions as a specified consigner designated under the Japanese Energy Saving Act. Major efforts include implementing a plan to transport goods on return trips, encouraging drivers to eco-drive, and promoting energy efficient devices such as digital tachometers and eco-tires on vehicles. In shipping, we continue to pursue energy efficiency technologies and operate new ships that are equipped with various energy-saving features. We are also supporting energy-saving operations for conventionally powered ships.

Our FY2021 CO_2 emissions were roughly 8% lower than in FY2020 thanks to energy efficiency initiatives and a decrease in shipping volume.

● CO_2 Emissions by Mode of Transportation (FY2021)

Non-consolidated

Mode of transportation	Tonnage transported (thousand t)	Average Distance Transported (km)	Transported tonne-kilometers (thousand tkm)	CO_2 emissions (thousand t)
Ship	16,147	469	7,576,805	105
Truck	14,150	55	781,305	46
Railway	5,001	26	127,890	3
Total	35,298	240	8,486,000	154

Recycling Waste and Other Materials

Relevant SDGs

Resource Recycling with Industries

Electric Power Utilities

We accept coal ash produced at coal-fired power plants and use it as a substitute for clay as a raw material in cement. In addition, we operate ash centers* to use more ash effectively. We also supply the power plants with limestone powder which is used to scrub the harmful sulfur oxides from the exhaust produced by the burning of coal. The reaction of the limestone powder with sulfur oxides forms by-product gypsum, which we make effective use of as a raw material for cement.

*Ash centers are distribution sites that combine collection/transportation (transshipment and storage) and intermediate-processing (powder mixing) functions. They receive coal ash from coal-fired power plants and ensure a stable supply to our cement plants, while also supplying diverse products that meet user needs.

Steelmakers

In the iron and steelmaking process, impurities are removed from iron ore to make iron.

We supply the limestone and quicklime used in the refining process. We also use blast furnace slag and steel slag, by-products that remain after the refining process, as raw materials for cement and as cement admixture.

Construction Soil

Traditionally this soil had been dumped into landfills. By making effective use of it as a cement raw material, we contribute to the conservation of natural resources and also help to prolong the life of landfills. We have also set up intermediary facilities that organically link sites where construction soil is produced to our nationwide plants, and strive to make them effective resources.

Resource Recycling with Local Communities

Most municipal waste is incinerated and the incinerator residue is buried in landfills, but it has become very difficult to find new landfill sites. Waste treatment has become a source of concern for Japan's major city governments in particular, and the situation is expected to get worse. We have three systems for recycling municipal waste and strive to make effective use of such resources and resolve environmental issues.

- Incineration Residues Recycling System

  A system for recycling municipal waste incineration ash (bottom ash and fly ash) as a raw material for ordinary Portland cement.

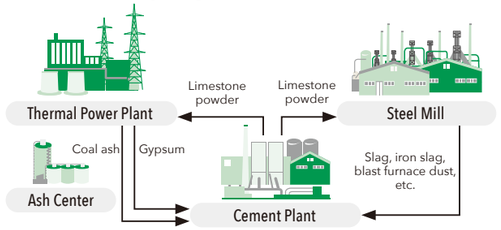
- AK System

  A system for recycling household waste and general business waste as alternative raw materials and fuels for cement manufacture. The waste is preprocessed through biological breakdown (fermentation) using a waste recycling kiln.

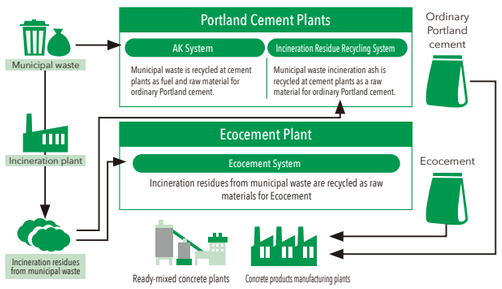
- Ecocement System

  Ecocement is a new type of cement made primarily from the municipal waste incineration residues. More than 500 kg of ash and other waste materials are used per tonne of Ecocement.

● Resource Recycling with Industries



● Resource Recycling with Local Communities



Performance of Recycled-Waste-to-Cement System

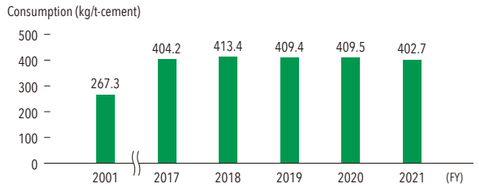
▶ GRI301-1, 2

All of our directly operated cement plants in Japan recycle waste and byproducts into alternative raw materials and fuels for cement. This helps to prolong the life of landfills, prevent the depletion of natural mineral resources, limit greenhouse gas emissions and reduce emissions of pollutants into the atmosphere.

In FY2021 we accepted a greater volume of wood chips, waste plastic, water treatment plant sewage sludge and ash, and municipal waste incineration ash. However, due to a decrease in the amounts of coal ash, blast furnace slag, by-product gypsum, unburned ash, dust, dust construction soil, and waste oil we accepted, the input of recycled waste and by-products was 6,108 thousand tonnes, a decrease of about 279 thousand tonnes on the previous fiscal year. This means we recycled 402.7 kg of waste and by-products per tonne of cement produced.

● Trends in Use of Waste and By-products per Unit Production

Non-consolidated

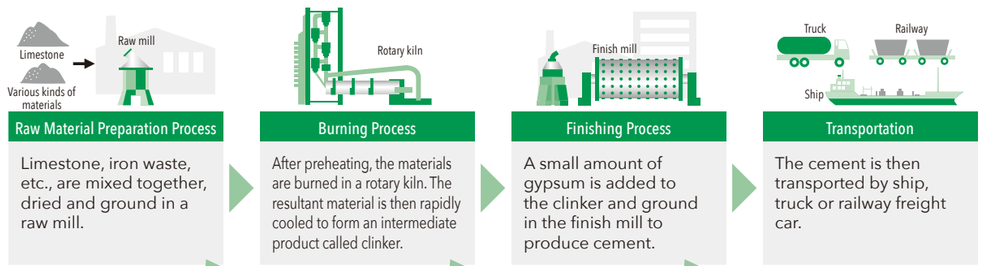


● Main Waste and By-products Used in Cement Plants (FY2021)

Non-consolidated

Waste and By-products	Total Amount (t)	Rate (kg/t-cement)
Coal ash	1,905,365	125.6
Blast furnace slag	1,090,049	71.9
By-product gypsum	500,474	33.0
Unburned ash, dust	509,304	33.6
Dirt and sludge	373,487	24.6
Construction soil	164,597	10.9
Waste oil	101,827	6.7
Wood chips	74,343	4.9
Waste plastic	181,953	12.0
Other	659,987	43.5
Water treatment plant sewage sludge and ash	373,217	24.6
Incineration residues from municipal waste	144,810	9.5
Municipal waste, etc.	28,617	1.9
Total	6,108,031	402.7
Raw material-related	5,516,164	363.7
Fuel-related	591,867	39.0
Total	6,108,031	402.7

● Waste and By-products Used in Cement Manufacturing Processes



Waste and by-products used

Raw materials
Blast furnace slag, coal ash, dirt and sludge, non-ferrous slag, steelmaking slag, construction soil, molding sand

Raw materials
Incineration residues from municipal waste, sewage sludge

Fuels
Waste oil, waste plastic, used tires, wood chips, RDF (municipal waste pellets), recycled oil

Gypsum
FGD gypsum, chemically derived gypsum

Admixtures
Slag powder, fly ash

Reference: Resources required to product one tonne of cement

Limestone:	1,201 kg
Clay:	222 kg
Silica:	75 kg
Iron waste:	27 kg
Gypsum:	39 kg
Coal, etc.:	112.6 kg
Electric power:	106.4 kwh

Conserving Biodiversity

Relevant SDGs

Environmental Impact of Our Operations

▶ GRI304-1, 2, MM1, MM2

Environmental Impact of Our Operations

Cement production starts with quarrying limestone, the primary raw material for cement. We also quarry many mineral resource products used as aggregates and industrial raw materials.

Since quarrying involves the removal of topsoil to expose the required ore, it inevitably impacts the environment and biodiversity of the area being developed. However, the limestone, rocks and sand we quarry only require crushing for particle size adjustment and sorting, and do not require any refining processes. Consequently, our operations are unlikely to cause chemical contamination to surrounding areas. In addition, we minimize the amount of waste stones generated during our limestone quarrying by using them as construction materials.

Limestone Quarries of the Group

The group operates 17 major limestone quarries around the world, which are located near to our integrated cement plants. The total site area* of the quarries is 4,269 ha (Japan: 2,608 ha; USA: 1,281 ha; other regions: 380 ha).

* Site area: The extent of the area where we conduct quarrying operations ,as measured by our in-house criteria

● Limestone Quarries of the Group

Region	Quarries	Site area (ha)	No. of quarries that require special care*
Japan	11	2,608	1
USA	3	1,281	0
Other	3	380	0

* "Require special care" refers to quarries that fall under Category IV or higher in terms of IUCN Protected Areas

Using the Integrated Biodiversity Assessment Tool (IBAT) provided by BirdLife International, we checked whether any of our group's limestone quarries are in any of the protected areas defined by the International Union for Conservation of Nature (IUCN). We found that none of our quarries are within or adjacent to Protected Area Category III or lower category areas. However, in Japan, one quarry is within a Category IV area and two are adjacent to Category IV areas.

All these quarries have obtained the necessary licenses from their local governments and conduct environmentally sound quarrying operations. They have no pending litigations concerning biodiversity or other environmental issues.

● Outline of IUCN Protected Area Categories

IUCN Categories	Outline
Ia: Strict Nature Reserve	Areas that have outstanding or representative ecosystems or have geographical or physiological features or characteristic species.
Ib: Wilderness Area	Large unmodified or slightly modified areas that retain their natural character.
II: National Park	Areas set aside to protect the environmental integrity of the ecosystem.
III: Natural Monument or Feature	Areas that have outstanding natural features or natural features of cultural value.
IV: Habitat/Species Management Area	Areas that require active interventions to maintain habitats or address the requirements of particular species.

Activities to Reduce Environmental Impact

▶ GRI103-2, 3, 304-1, 2, 3, 4, MM1

Throughout the group we believe that balancing the conservation of ecosystems in local communities and development of the communities themselves is important in quarry operations. With this belief, we hold discussions with local governments, local communities and academics while operating quarries. This helps to ensure we not only prevent pollution but also conserve biodiversity and water resources while minimizing our environmental impact.

Environmental Impact Assessment

In developing quarries we conduct ex-ante assessments of environmental impact of the development of quarries based on environmental research of the development area such as on biodiversity and water resources. We then discuss the results of the research with local governments, local communities, academics and other stakeholders before finalizing a development plan. Moreover, we regularly monitor the surrounding environment during the development and operations of quarries, and report to our stakeholders on the environmental impact that the quarries have in their areas.

For instance, in the new development of a quarry in the Ofunato Quarry, Iwate Prefecture, we conducted environmental assessment for approximately ten years. We focused on preserving rare wildlife species in cooperation with external experts and local residents. Furthermore, we minimized noise and vibration during the development work and also limited the traffic hours for trucks used in construction work. In addition, even after development work begins, we carry out regular assessments and implement environmental protection measures.

Raptors survey (Ofunato Quarry)

Biodiversity Protection

When environmental impact assessments determine that protection is required, we protect rare species and the like via measures such as installing protective equipment, transplanting and restricting development work.

Since 1972, at the Minowa Quarry of Chichibu Taiheiyo Cement Corporation, we have been protecting and nurturing rare species of native plants on Mt. Buko, which is located in Chichibu City and Yokoze Town in Saitama Prefecture. We created a botanical garden at the quarry and, together with local experts and other people, we preserve 68 native plant species there while increasing the plant population. Additionally, our Central Research Laboratory continues to research and develop ways to protect and propagate plants, and to verify the genetic diversity of wild specimens using biotechnology. Since 2016, in the course of developing the Ofunato Quarry, we have been working with experts to protect and propagate various rare plant species in their native biospheres by creating a botanical garden on the side of the office of Ryushin Mining Co., Ltd.

Protecting the natural habitat of rare plants (Ofunato Quarry)

Greening Quarries

Rocks and soil are exposed in working quarry areas, and no vegetation is left. However, if no quarrying work is expected for some time we strive to green such areas as soon as possible. We also plant vegetation in excavated topsoil stockyards and in places where the contours of the soil will remain unchanged for a while. At some quarries, at the request of the local community, we restore greenery if operations have been suspended for several months.

We basically plant vegetation that is native to the region. In our greening of quarries in Japan in FY2021, we scattered seeds over a total area of 26,294m² and planted 3,944 saplings.

Other efforts include participating in an annual tree planting campaign with contractors and local residents to improve awareness of quarry development and greening activities.

Greening quarry slopes (Buko Quarry)

Water Resource Conservation

In quarrying we also pay close attention to protecting not only terrestrial plants but also water resources such as rivers and natural springs in an effort to contribute to biodiversity. From the perspective of conserving water resources, spring water discharged from quarrying and rainwater is directed into retention basins to minimize impact on the environment outside of the quarrying area. In some quarries we drill wells for domestic water and supply this water to local communities for everyday use.

Use of Old Quarry Sites

We reuse old quarry sites where operations have completely ended after consultation with the local community. When greening a site we strive to restore the original vegetation.

Reducing Environmental Impact

Relevant SDGs

Preventing Environmental Pollution

▶ GRI305-7

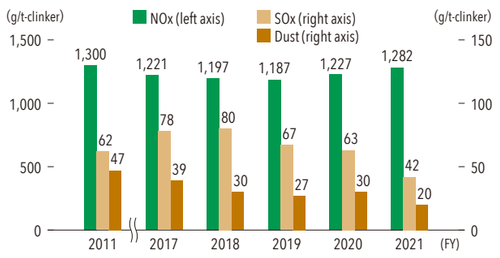
Air Pollution

Air pollutants generated from cement production are primarily NO_x, SO_x and dust in combustion gases emitted from cement kilns. To ensure the proper management of these substances we strive to reduce air pollutant emissions through measures such as installing equipment to continuously monitor emission concentrations, improving NO_x reduction systems and installing bag filter equipment to capture dust emissions. Our target in this is to maintain our FY2011 emissions levels.

In FY2021, emissions of NO_x, SO_x and dust were all lower than the figures for FY2011, our benchmark year. Furthermore, the level of SO_x emissions was very low compared to the limit set under the Air Pollution Control Act.

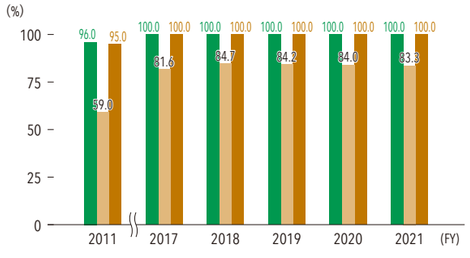
● Specific Emissions of Clinker for Selected Pollutants

GCCA



● Monitoring Rate

GCCA



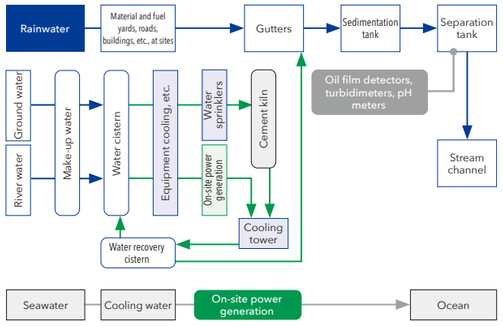
■ Percentage of clinker volume manufactured in a kiln equipped with continuous NO_x measurement
■ Percentage of clinker volume manufactured in a kiln equipped with continuous SO_x measurement
■ Percentage of clinker volume manufactured in a kiln equipped with continuous dust measurement

Reference guidelines: "GCCA Sustainability Guidelines for the monitoring and reporting of CO_2 emissions from cement manufacturing Ver. 0.1" GCCA

Water Contamination

Most of the water discharged from our plants to public waters is cooling water and not polluted as defined in the Water Pollution Control Act. At our cement plants all water resources are reused as circulation water to minimize the impact of water discharge into public waters. Moreover, we are installing sedimentation tanks, water-oil separation tanks, oil film detectors, pH meters and suspended solid sensors on water discharge routes that connect to public waters.

● Example of Water Circulation Flow at a Cement Plant



Soil Contamination

In FY2001 Taiheiyo Cement evaluated the risks associated with cement plants that may be sited on contaminated ground by appointing an expert consultant to undertake a soil history survey. We are continuing to conduct drilling surveys, starting with the higher-risk locations, to verify whether or not the soil is contaminated. Actions have been taken as necessary based on the findings.

We are also working to eliminate the possibility of soil contamination via measures to prevent the leakage of wastewater from scrapyards or fluid from oil tanks, acid/alkali tanks, pipes and so forth.

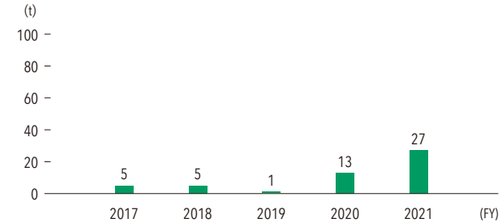
Reducing Waste

▶ GRI306-2

Initiatives at Plants and Quarries

Our cement plants and quarries reduce the amount of waste handled by disposal contractors by reusing waste from operations as material for cement production. We also endeavor to reduce waste that ultimately ends up in a landfill via measures such as the use of chromium-free kiln bricks.

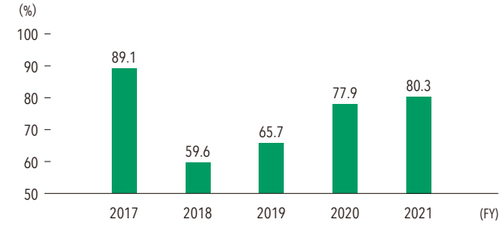
● Volume of Waste to Landfill



Initiatives at Service Stations

Service stations (SS) reduce the waste handled by waste disposal contractors by returning any residual cement that remains in silos after switching the cement products. Returned cement is recycled as raw material. In FY2021, the recycling rate was 80.3%, up 2.4% from the previous fiscal year.

● Recycling ratio



Initiatives at Offices

Our special purpose subsidiary, Taiheiyo Service Corporation, recycles the company's used copy paper for efficient use in-house. Approximately 340,000 sheets of A4 size paper were recycled in FY2021.

Appropriate Management of Chemical Substances

▶ GRI306-2

Pollutant Release and Transfer Register (PRTR)

The PRTR Law requires that we report on equipment installed at our Kumagaya plant for the washing of municipal waste incineration ash. This washing process uses water, and our total discharge of dioxins and ferric chloride into public waterways are as shown below.

● Reported Levels of Dioxins and Ferric Chloride Emissions

Non-consolidated

Emissions	Reported Levels		
	FY2019	FY2020	FY2021
Dioxins (mg-TEQ)	0.0	0.0	0.0
Ferric chloride (kg)	170	152	170

Management of PCB Waste

We properly store and dispose of high and low concentrations of PCB waste in accordance with the Amendment to the Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes (revised in 2016), hereinafter referred to as the PCB Special Measures Law.

For high-concentration PCB waste with an early disposal deadline as stipulated by the PCB Special Measures Law, we signed a processing contract with the Japan Environmental Safety Corporation (JESCO) in 2006 and have prioritized processing.

Pollutants such as electrical ballasts stored at the Ofunato Plant, Fujiwara Plant and the former Kawara, Tosa and Osaka plants, as well as at the Chichibu quarry and branch office service stations, were processed in FY2021. Transformers and capacitors containing high-concentration PCB in the Kyushu, Chugoku and Shikoku area were processed before March 31, 2018. However, we have confirmed that two unprocessed capacitors still remain in that area. We have submitted a report to the prefectural governor about the two capacitors, and they are being stored appropriately until the local government decides on the disposal method for equipment that has passed its deadline for processing.

Pollutants such as electrical ballasts stored at the Ofunato Plant, Kumagaya Plant, Saitama Plant and Chubu Hokuriku Branch service stations are scheduled for processing in FY2022.

● Treatment of High-concentration PCB Waste

Non-consolidated

(No. of machines)

Waste	Stored in FY2020(as of March 31, 2020)	New Target for FY2021	Treated in FY2021	Stored in FY2021(as of March 31, 2021)	Treatment Scheduled for FY2022
Capacitors	0	2	0	2	0
Transformers	0	0	0	0	0
Electrical ballasts	1,750	355	1,169	936	627
Total	1,750	357	1,169	938	627

Appropriate Use of Water Resources

Relevant SDGs

Water Risk Analysis

▶ GRI303-1

According to the results of the water risk analysis conducted using the Water Risk Filter*, the average score for the total basin risk for all our plants (weighted average taking into account the cement production volume) was 2.6. The highest total basin risk score was 3.5, and the average score was 0.2 lower than that of the previous year. The volume of cement produced at the plant in question accounted for about 13% of the production volume of all the plants. However, when we analyzed conditions at that plant, no urgent issues were identified.

* A water risk mapping tool developed by the World Wide Fund for Nature (WWF). It is used to evaluate business impacts related to water scarcity, flooding, drought, seasonal variation, physical water quality risks, regulatory risks, etc. The maximum score is 5.0, and the higher the score, the greater the risk.

Water Consumption

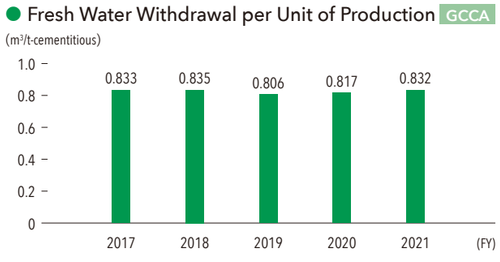
▶ GRI303-1, 2, 3, 4, 306-1

Most of the water used at our cement plants is for the cooling of production equipment, exhaust gas and in-house power generators. Therefore, the water discharged from the plants is mostly cooling water, which is not polluted as defined in the Water Pollution Control Act. Our plants near the ocean use seawater to cool in-house power generation equipment. All the fresh water used at the plants is circulated and reused, except for the household wastewater, as we strive to reduce our water withdrawal and lessen the impact of wastewater on bodies of water.

Our total withdrawal of fresh water in FY2021 was about 27.19 million m³ and our total withdrawal of seawater about 150 million m³. The seawater was used to cool in-house power generation equipment at our plants near the ocean and then released back into the sea after use. The amount of fresh water discharged was approximately 13.45 million m³, meaning that about 13.75 million m³ of fresh water was used at the plants. However, most of this water is not used as a raw material and evaporates after being used to cool equipment or gas.

In FY2021 our fresh water withdrawal to produce 1 tonne of cement was 0.832 m³ (withdrawal per unit of production). There was no great change in our water consumption efficiency.

● Fresh Water Withdrawal per Unit of Production GCCA



● Water Consumption GCCA

(Unit: thousand m³)

	FY2017	FY2018	FY2019	FY2020	FY2021
Surface water	7,505	8,130	6,521	5,626	5,355
Ground water	16,232	16,370	16,884	18,656	18,759
Industrial water	2,983	3,095	3,251	3,325	3,078
Total fresh water withdrawal (I)	26,719	27,596	26,656	27,607	27,192
Total seawater withdrawal	146,097	149,056	149,776	147,372	146,232
Total water withdrawal	172,816	176,652	176,432	174,979	173,424
Total fresh water discharge (O)	12,964	12,294	12,167	13,674	13,447
Total seawater discharge	146,097	149,056	149,781	147,377	146,368
Total water discharge	159,061	161,350	161,948	161,051	159,815
Total fresh water used (I-O)	13,755	15,302	14,489	13,933	13,745

Reference guidelines: "GCCA Sustainability Guidelines for the monitoring and reporting of water in cement manufacturing Ver. 0.1" GCCA

Appropriate Use of Water Resources

▶ GRI203-1, 303-1, 2, 3, 4, 5, 306-1, 413-1

At present there are no specific concerns regarding water resources that may be raised by local communities. However, we are striving to reduce water withdrawal with a view to conserving water resources. In addition, we maintain close communication with local communities and contribute to the appropriate use of local water resources.

Taiheiyo Cement Philippines, Inc. supplies clean water to local communities in the Philippines from wells drilled by the company for water to use in its plants.

CalPortland Company has constructed a system for the sustainable use of water at its Rocky Canyon Aggregate Plant in California, USA. This system has improved the collection and storage of rainwater and spring water at the site. Developing these water resources has made it possible to secure a supply of the water it needs in its work, without having to build new wells or increase the volume of ground water it extracts, and also to keep the amount of water that drains out of the site to a bare minimum. (There are strict regulations with regard to water that drains out of a site.)

System for the sustainable use of water (California)

Environmental Accounting

Relevant SDGs

● Environmental Conservation Expenditure (Non-consolidated) (Unit: million yen)

Category		Main Activities	Investment			Cost		
			FY2019	FY2020	FY2021	FY2019	FY2020	FY2021
Business area costs			2,161	3,624	3,964	10,632	10,834	9,456
Details	Pollution prevention	Water pollution prevention etc.	1,537	2,128	1,904	3,996	3,996	3,980
	Global environmental conservation	WHR power generation systems etc.	381	1,352	1,667	6,197	6,197	4,907
	Resource recycling	Waste treatment etc.	243	144	393	439	439	569
Upstream and downstream costs		Recycling waste and by-products as alternative raw materials and fuels for cement	3,933	3,020	1,255	4,955	4,955	6,189
Administrative costs		Environmental management etc.	65	113	78	141	141	151
R&D costs		Innovative cement manufacturing processes etc.	556	539	537	812	812	867
Social activity costs		Plant tours etc.	2	0	0	28	28	43
Environmental remediation costs		Emission levies etc.	0	97	172	87	87	87
Total			6,717	7,393	6,006	16,655	16,655	16,793

(Unit: million yen)

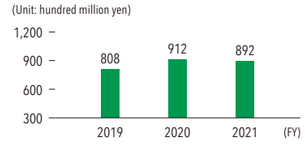
	FY2019	FY2020	FY2021
Total investment	20,020	20,975	23,057
Total R&D expenditure	1,192	1,195	1,246

External Economic Benefits Derived from the Recycled-Waste-to-Cement System

We use the external economic benefit (EEB) evaluation method to express, in monetary terms, our evaluation of socioeconomic benefits from environmental impact reduction due to increased recycling of waste accepted from outside the company. We calculate that we created a social benefit of 89.2 billion yen in FY2021. The total amount of waste and by-products used in FY2021 was less than in the previous fiscal year, leading to an approximate 2% decrease in economic benefit on FY2020.

● External Economic Benefits (FY2021) (Non-consolidated)

Impact	Inventory	Reduction (t)	Inventory Market Price (Yen/t)	External Economic Benefit (Hundred million yen)
Climate change mitigation	CO_2	1,779,704	3,000	53
Depletion of energy resources	Crude oil	105,344	18,400	19
Depletion of mineral resources	Natural resources	4,671,056	1,000	47
Shortage of landfills	Waste	5,152,393	15,000	773
Total				892



Taiheiyo Cement's External Economic Benefit Evaluation

- We have developed a unique evaluation method to estimate the contribution to overall environmental benefit to society by utilizing waste materials from other industries.
- We use information, including data collected for the GCCA Cement CO_2 Protocol, to calculate the reduction in consumption of fossil energy and natural resources associated with the use of waste and by-products.
- Economic benefits are calculated by multiplying reductions in consumption (effects of environmental conservation) by set market prices.
  The market values of the inventory items are set at FY2001 levels, and are estimated on the basis of the following considerations.
  CO_2: 3,000 yen/t (a hypothetical CO_2 emission tax rate). Crude oil: import price. Natural resources: estimated price. Waste: controlled landfill costs in the Tokyo area.
- A portion of the EEB is accounted for in our profit and loss statement.

Environmental Accounting for One of Our Projects

Installation of a Hydrated Raw Material Mixing System at the Fujiwara Plant No. 5 Kiln

▶ GRI201-2

In order to boost the rotary kiln firing efficiency, standard raw materials for cement are dried, pulverized and homogenized in a raw mill. In recent years the amount of substitutes used for natural resources is increasing, and some of those recycled resources have a strong odor like hydrated sludge and cannot be processed in a raw mill. This makes it necessary to feed them directly into a rotary kiln to decompose any malodorous components.

The hydrated raw material mixing system installed at the Fujiwara Plant No. 5 Kiln in FY2021 was jointly developed by Taiheiyo Cement and Taiheiyo Engineering Corporation. It is a new type of mixing system that separates high-temperature raw materials inside the preheater and premixes them before they are fed into the rotary kiln, thereby dramatically boosting drying and firing efficiency. The new mixing system will lead to less thermal energy being required for clinker burning, and is intended to further reduce CO_2 emissions and environmental impact.

Investment: Approx. 340 million yen

Reduction in CO_2 emissions: 2,388 tonnes/year

Hydrated raw material mixing system

Material Balance of the Cement Production Process

Scope of data: The data aggregated are for our four business segments (cement, mineral resources, environment and power generation) collected at our (non-consolidated) quarries and plants, at the quarries shown below of subsidiaries that supply us with materials (nine quarries of eight companies) and at affiliated companies engaged in the power generation business (3 companies).

Ryushin Mining Co., Ltd.	Ofunato Quarry (Iwate Prefecture)
Buko Mining Co., Ltd.	Buko Quarry (Saitama Prefecture)
Chichibu Mining Co., Ltd.	Mido Quarry (Saitama Prefecture)
Ishizaki Co., Ltd.	Fujiwara Quarry (Mie Prefecture)

Oita Taiheiyo Mining Corporation	Shin-Tsukumi Quarry (Oita Prefecture)
Myojo Cement Co., Ltd.	Toumi Quarry (Niigata Prefecture)
Chichibu Taiheiyo Cement Corporation	Miwa Quarry (Saitama Prefecture)
	Kanouyama Quarry (Gunma Prefecture)

Tosayama Taiheiyo Mining Corporation	Tosayama Quarry (Kochi Prefecture)
Ofunato Power Inc.	Ofunato Power Plant (Iwate Prefecture)
Tosa Power Inc.	Tosa Power Plant (Kochi Prefecture)
Itoigawa Power Inc.	Itoigawa Power Plant (Niigata Prefecture)

INPUT

Water withdrawal

Total water withdrawal (thousand m³)	191,429
Tap water	1,497
Industrial water	4,173
River water	5,306
Ground water	12,350
Rainwater	300
Seawater	167,803

Energy

Coal	2,225,888t
Petroleum coke	250,883t
Heavy oil	24,262kl
Diesel oil	20,544kl
Other	53,805t
Recycled fuels	1,042,776t
Purchased electricity	551,542MWh

Materials

Additives, etc.	7,735t
Explosives	3,818t
Refractory materials	9,017t
Grinding media/Steel casing	2,453t
Lubricants/Chemicals	3,567kl
Other	34,010t

Raw materials

Natural Resources	
Limestone	34,940,122t
Silica	1,616,798t
Gypsum	77,888t
Other	11,967t
Waste and By-products	
Iron waste	195,727t
By-product gypsum	470,110t
Fly ash, coal ash	2,125,467t
Blast furnace slag	780,452t
Other clay substitutes	1,696,968t

Raw material procurement

Limestone 100% sourced in Japan

Limestone is the only mineral resource in which Japan is self-sufficient. Japanese limestone contains high-quality calcium carbonate and has become the source of a stable cement supply.

Ratios of Japan's self-sufficiency in other mineral resources

- Liquefied natural gas: 2.4%
- Crude oil: 0.3%
- Iron ore: 0%

Production

Utilization of Waste and By-products

In our cement production we make efficient use of blast furnace slag from steel mills and thermal power plants, coal ash, industrial waste such as plastic and oil from various industries, ash from incinerated municipal waste, and disaster waste generated by natural disasters as recycled materials for cement. We utilize 402.7 kg of waste and by-products to produce one tonne of cement.

Zero Waste from Cement Production

Basically, secondary waste is not generated since we use flammable waste as a substitute for fossil energy, and combustion waste is utilized as a raw material for cement.
Since cement is fired at a temperature of 1,450°C, hazardous chemicals generated during the production process, such as dioxins and fluorocarbons are decomposed and detoxified.

Transportation

Comprehensive Transportation Network

We possess 9 cement plants, over 100 service stations, and 36 cement tankers in Japan, and provide a stable supply of our products via our robust manufacturing, transportation and supply chain infrastructure.

Utilization

Contributions to infrastructure

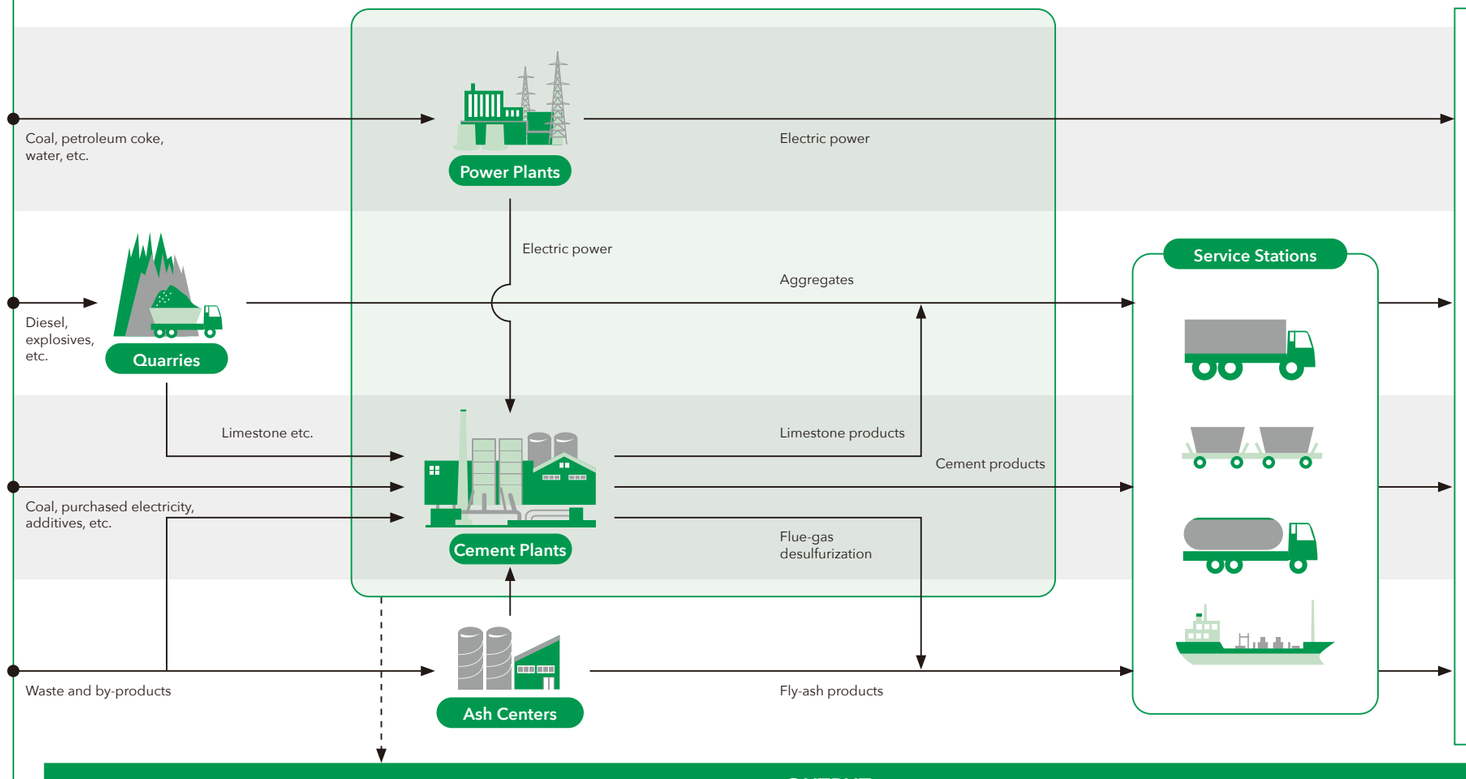
As stated in The Value of Cement on pages 10 and 11, cement is used for various purposes to create safe and stable infrastructure that improves people's daily lives, makes economic activities more convenient, and protects communities from natural disasters.

Power Generation Business

Mineral Resources Business

Cement Business

Environmental Business



Products by Business

Power Generation

Electric power (sales of electricity)	2,396,837MWh

Mineral Resources

Aggregates	7,827,271t
Limestone products	4,663,324t
Other	359,604t

Cement

Portland cement	12,029,436t
Blended cement	1,741,877t
Cement based soil stabilizers	529,085t
Clinker (for export)	2,288,118t

Environmental

Flue-gas desulfurization	104,585t
Fly-ash products	156,627t

OUTPUT

CO_2 Emissions

CO_2	14,269,840 t
From purchased electricity	189,608 t

NO_x Emissions

NO_x*	24,020 t

SO_x Emissions

SO_x*	1,538 t

Dust Emissions

Dust *	283 t

Dioxin Emissions

Dioxins*	0.24 g-TEQ

Waste Emissions

Waste externally consigned for treatment	632 t
Waste sent to landfills	27 t
Valuables such as scrap metals	6,701 t

Water Discharge

Wastewater	181,846 thousand m³
Seawater	167,934 thousand m³
Fresh water	13,621 thousand m³
Household wastewater	292 thousand m³

* Cement and power generation businesses only (excluding purchased electricity)