

Strengthening Production Systems



We will build a sustainable production system and continue to be responsible for supplying important materials for national resilience.

Koshiro Hidaka Director and Senior Executive Officer

Production and Equipment System Strategy based on the 26 Medium-Term Management Plan

We will optimize our production system to regenerate our domestic business, one of the fundamental policies of the 26 Medium-Term Management Plan. While domestic demand continues to be sluggish, there is strong demand for blended cement overseas. We will build an operating system that is not limited to domestic demand while making use of our existing locations and facilities, such as accelerating the shift to a production system for the export of a variety of cement types, including blended cement, mainly at plants located in coastal areas.

In addition to optimizing our production system in this way, we will promote the replacement of major machinery and the advancement of AI-based upgrading of production and equipment management in order to establish a stable production and supply system for national resilience. We have already begun developing remote operation technology and upgrading equipment inspection methods at some plants to promote the creation of smart factories, which will not only address labor shortages and reduce costs, but also contribute to improved occupational safety by managing signs of equipment failure and abnormalities through continuous monitoring.

Challenges for Strengthening Cost Competitiveness

Although the price of coal, which soared in FY2023, is settling down, the future outlook is uncertain and measures are needed to further reduce costs. Although the effective use of waste contributes to reducing manufacturing costs, competition in waste collection has intensified in recent years, so we need to differentiate ourselves through our network and processing technology, such as by treating waste that cannot be handled by other industries at a higher level and utilizing it as raw material and fuel.

In addition, we will reduce costs by establishing a system that transforms each production site into an "integrated factory" that maximizes efficiency by considering not only the factory but also the production department, resource department, environmental department and cement sales department. At the same time, we aim to establish a sales system that can respond to the diverse needs of users with a one-stop service.



Equipment inspection by drone (Kumagaya Plant)

Key Initiatives

- (1) Accelerate the shift to blended cement**
In order to accelerate the shift to a production system suitable for the stable supply of blended cement for which there is strong demand overseas, we will undertake capital investment at our coastal plants to diversify cement types and increase export capacity.

(2) Maximizing waste treatment
As competition with other companies in the same industry and different industries for waste collection is intensifying, we will work to collect and utilize wastes that are difficult for other industries to accept and waste plastics that were previously sent to landfills, while also considering the introduction of technology from outside sources.

(3) Toward the elimination of occupational accidents
To prevent occupational accidents which have been on the rise, we have installed safety experience training facilities using VR (virtual reality), and are working to prevent heatstroke by improving the workplace environment, managing internal body temperature using wearable devices, and increasing the introduction of air-conditioned work clothes.
- (4) Promotion of smart factories**
We are establishing an AI-based life span prediction system using sensors, drones and image processing technology as a way to upgrade the equipment management system, using the Kumagaya Plant as a model. We are also developing an AI-based operation support system and remote operation technology at the Kamiiso Plant.

(5) Development of a system for integrated factories
Limestone and aggregates in the mineral resources business and waste and by-products in the environmental business are important raw materials and fuels for cement production, and the three businesses are closely linked in the value chain. We will carry out management across the entire company and aim to increase sales and improve operational efficiency as "integrated factories."

(6) Technology transfer
We will focus on developing human resources to improve technical skills by implementing initiatives such as "Techno Schools" for mid-level engineers at each factory to intensively learn specialized knowledge, expanding the scope to include contractor engineers learning maintenance skills at "Maintenance Dojo" and short-term overseas assignments for engineers.

Roadmap for Long-Term Vision 2050

FY2024 Results	Plan for FY2027	Future vision targeting 2050
<ul style="list-style-type: none">Initiatives for revision of the Japanese Industrial Standards (JIS) for cementStrengthening cost competitiveness Strengthening the collection of recyclables Fossil energy substitution rate: 20.7% (Japan and overseas)Smart-factory technology development AI-based equipment management Remote operation	<ul style="list-style-type: none">Accelerating the production and export system for blended cementSophistication of waste treatment technologyFurther evolution and sophistication of smart-factory technology	<ul style="list-style-type: none">Operation of carbon neutral plantsRealization of smart factories and maximization of labor productivity

Promotion of smart factories

Operation Division	Inspection Division	Production Department
<p>Current Operators monitor 24 hours a day</p> <p>Future 100% automation Remote support from headquarters</p> <ol style="list-style-type: none">Introduction of automated kiln controlRemote support for operation Kamiiso Plant - Domestic deployment - Overseas deployment	<p>Current Inspection by inspectors</p> <p>Future Unmanned inspection, AI-based life span prediction</p> <ol style="list-style-type: none">Analyze data collected from sensors using AI to predict signs and estimate life spanUse of drones Kumagaya Plant - Domestic deployment	<p>Current Heavy machinery operation, transportation and inventory measurement by workers</p> <p>Future Automation and remote control of work</p> <ol style="list-style-type: none">Introduction of remote operation and automated operation of heavy machineryAutomation of bagged cement product shippingAutomation of inventory measurement by drone

Research and Development Strategy



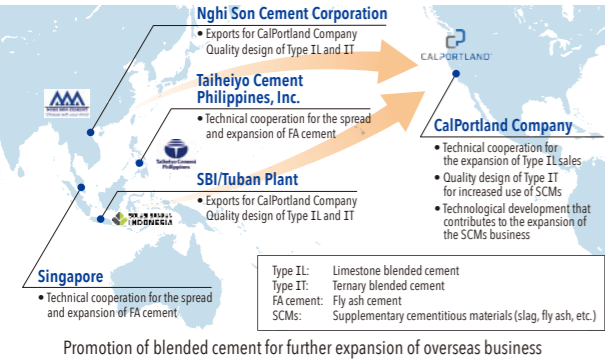
We will promote research and development that contributes to the business expansion and profit improvement of Taiheiyo Cement Group.

Hiroyuki Takano Managing Executive Officer

Key Strategies of the 26 Medium-Term Management Plan and the R&D System of the Research and Development Department

We aim for our Research and Development Department to become one that "anticipates environmental changes, proposes innovations and contributes to the entire group" by 2050. To achieve this, we have formulated four key strategies in the 26 Medium-Term Management Plan: "contributing to business expansion and profit improvement," "technological development toward carbon neutrality," "developing into a group-wide research center" and "research and development for sustainable growth."

As for our R&D system, we would like to establish a system that can promote research and development by bringing together the comprehensive capabilities of Taiheiyo Cement Group to develop into a group-wide research center. We are working to strengthen the functions of our Central Research Laboratory so that it can play the role of "think tank" for the group. To that end, in April 2024 we established a new "NEXST Team," reporting to the director of our Central Research Laboratory, as a dedicated organization to study specific concepts. In addition, to further strengthen our research and development capabilities, we will also work to develop human resources who can contribute to the growth and development of the Taiheiyo Cement Group through practical education to develop global human resources, and the exchange of human resources and technologies with outside parties.



Promotion of blended cement for further expansion of overseas business

Promotion of Blended Cement for Further Expansion of Overseas Business

In the U.S. market, demand for blended cement is rapidly expanding against the backdrop of carbon neutrality. To meet this demand we are working with our U.S. group company, CalPortland Company, to expand sales of limestone blended cement (Type IL), and are carrying out quality design that meets local needs, such as improving durability. In addition, to further expand our blended cement business in the United States, we are collaborating with PT. Solusi Bangun Indonesia Tbk. (hereinafter referred to as SBI), a state-owned Indonesian company with which we have a capital and business alliance, to export blended cement from Southeast Asia, by proposing manufacturing formulas and providing technical cooperation. The Type IL to be exported from SBI has already received quality certification from the local government in the United States and we expect to be able to start exporting soon. Furthermore, we are also conducting research on ternary blended cement (Type IT), which is expected to have a higher blending ratio than Type IL. In Japan as well, expanding the use of blended cement is an important initiative as a measure to reduce CO₂ emissions, and we will use the knowledge we have accumulated in overseas markets to develop new blended cements and standardize them, aiming for early practical application.



On-site construction of concrete products using CARBOFIX cement



Technological Development toward Carbon Neutrality

We are working to spread and expand the use of blended cement, low carbon product, as an immediately effective approach toward achieving carbon neutrality by 2050. In addition, as a progressive approach toward 2030, we are working to implement "CARBOFIX cement," a cement-based material that reacts with and fixes CO₂, and "CARBOCATCH," which efficiently absorbs CO₂ into cement-based slurry. We are steadily gaining experience, such as conducting test constructions, for both of these technologies. In addition, to reduce fossil energy-derived CO₂ emissions, we are promoting the development of advanced burner combustion technology and other technologies to expand the use of combustible waste as an alternative to fossil fuels. On the other hand, since it is also important to deal with chlorine, which is contained in combustible waste and is an undesirable component in cement production, we are further developing our unique chlorine removal technology, the "Chlorine Bypass System" to make it even more efficient. In the current situation of soaring energy prices, expanding the use of combustible waste is expected to contribute not only to achieving carbon neutrality and circular economies, but also to our profits.

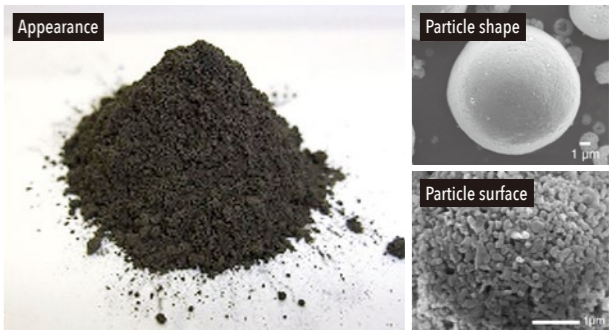


Test construction of a concrete pavement using CarboCatch slurry

Research and Development for Sustainable Growth

By utilizing the knowledge of inorganic chemistry cultivated through cement research and development and the effective use of our resources, we aim to commercialize our unique functional materials at an early stage to make them a new source of revenue for sustainable growth. "CellSpheres," our functional hollow particles, have been adopted by three manufacturers working to develop new products. We have started shipping samples of "Nanolithia," a cathode material for lithium-ion batteries produced at a demonstration plant with an annual capacity of 150 tonnes. In addition, we are providing technical support for the enhancement of production facilities for "ultra-pure silicon carbide (SiC)," a material for power semiconductors used in electric vehicles and data centers, etc., as demand is expected to expand in the future.

Needs surrounding social challenges are diversifying, such as the increase in severe disasters due to recent climate change, labor shortages and aging social infrastructure. To meet these needs, we have built our own market-in type theme exploration system and are focusing on creating new research and development themes. We will also promote incubation activities for the early commercialization of development themes.



"Nanolithia," a cathode material for lithium-ion batteries

Intellectual Property Strategy

Fundamental Intellectual Property Policy

Our basic policy is to contribute to the sustainable growth of the Taiheiyo Cement Group through intellectual property activities that support business expansion by promoting an intellectual property strategy that secures a competitive advantage." Based on this policy, we have established three key initiatives: intellectual

property activities that secure a competitive advantage, intellectual property consulting activities that contribute to management and business, and Group collaboration activities related to intellectual property.

Promoting an Intellectual Property Strategy to Secure a Competitive Advantage

To secure a competitive advantage, we will focus on acquiring intellectual property rights for technologies related to further expansion of our overseas business and improvement of the profitability of our domestic business. For technologies related to carbon neutrality, we will promote the creation of a group of intellectual property rights with a view to global deployment. We will also strive to protect intellectual property rights for technologies related to expanding the use of blended cement, measures to combat intensifying disasters caused by climate change, and DX-related technologies for cement and concrete. Additionally, we will promote the branding of technologies through an intellectual property mix strategy that secures trademark rights and other rights related to patent groups.

We have steadily expanded our intellectual capital to support our future business. The percentage of patent applications by field in the three years of the 23 Medium-Term Management Plan was 28% for carbon neutral technology-related fields and 32% for future technologies using innovative materials, IoT/AI. We support research and development and social implementation

with a view to creating new profits through innovative materials and achieving sustainable growth through the realization of carbon neutrality by securing intellectual property rights. The next highest number of patent applications was for technologies related to strengthening national resilience at 23% followed by technologies related to the formation of circular economies at 17%. These technologies contribute to the expansion of the Taiheiyo Cement Group's business while responding to the needs of a low-carbon society, including those related to severe disasters caused by climate change, and blended cements.

While obtaining a patent has the advantage of granting rights, it also means that the content of the proprietary technology is disclosed. Therefore, in the case of advanced materials such as functional materials, we may consider it more advantageous not to file a patent application and instead secure a competitive advantage by keeping our know-how confidential. On the other hand, we are steadily implementing intellectual property risk management to avoid unintentionally infringing on the rights of other companies.

We will promote an intellectual property strategy that maximizes the technological capabilities of the group

In our company the same director is in charge of research and development and intellectual property activities. Close cooperation between the Research and Development Department and intellectual property activities, such as patent acquisition, is essential to maximize technological capabilities and achieve the goals set by the entire company and each business division. We will strategically promote the creation of a group of intellectual property rights for developed technologies, thereby contributing to strengthening the business competitiveness and enhancing the corporate value of the Taiheiyo Cement Group.



Hiroyuki Takano
Managing Executive Officer

Promotion of Intellectual Property Consulting Activities

In intellectual property consulting activities that contribute to building a business environment advantageous to our company and creating new businesses, we will actively develop IP landscape activities that provide analysis results of intellectual property information and other information that can be used for business and research and development strategies. In FY2024, we conducted 19 analyses (previous fiscal year: 10) for a wide range of purposes, including analysis of technology trends and exploration of new applications, and provided the results to related departments. In a new initiative, we searched for development partners based on patent information and obtained results that contributed to the selection of joint research partners.

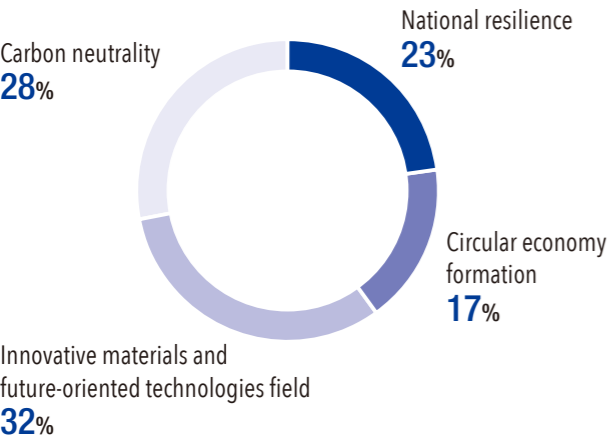
In the 26 Medium-Term Management Plan we will focus on identifying areas where we should focus and identifying intellectual property risks through analysis of intellectual property information related to carbon neutrality and blended cement. We will create an inventory of our patented technologies and conduct objective quantitative evaluations, aiming to establish intellectual property consulting activities with strong information analysis capabilities.

Intellectual Property Management Promotion through Collaboration between Divisions

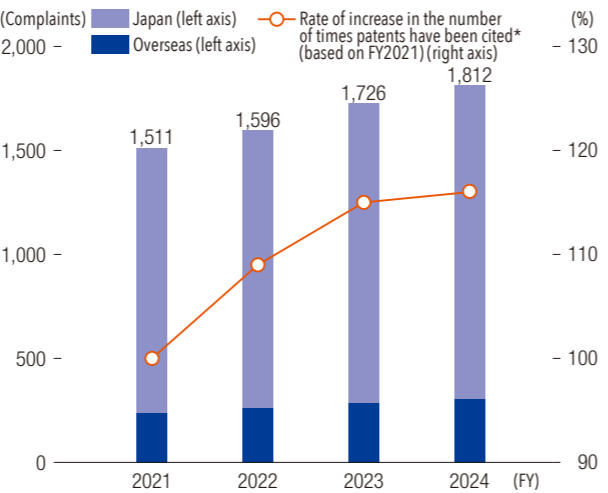
Intellectual property management is promoted under the Intellectual Property Rights Management Committee (Chairperson: Director in charge of the Intellectual Property Department). The Intellectual Property Department will lead "Intellectual Property Strategy Meetings" which are attended by the heads of related departments to discuss applications and rights acquisition with the Research and Development Department. "Intellectual Property Promotion Meetings" promote intellectual property activities according to the challenges and needs of the business divisions. Thereby, intellectual property activities are promoted through the trinity of the Intellectual Property Department, the Research and Development Department, and the business divisions. We also hold regular meetings where intellectual property promoters from each department gather to disseminate policies on intellectual property and review various intellectual property activities.

To strengthen interdepartmental cooperation, it is essential to raise the level of intellectual property capabilities across the entire group. We will enhance hierarchical education on intellectual property according to years of experience and expertise and, as an incentive, we will provide rewards to inventors and commend employees who have made significant achievements in intellectual property.

Patent Application Ratio by Technical Field (3 years of the 23 Medium-Term Management Plan)

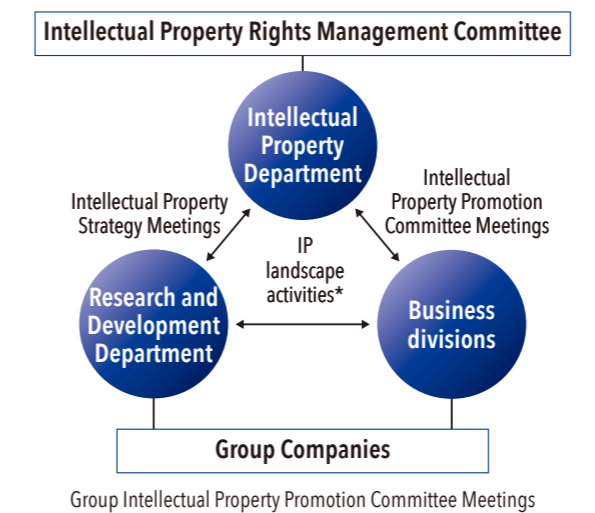


Number of patents held and the number of times patents have been cited



* An indicator of the deterrent power that our patents have had on the establishment of other companies' patents

Intellectual Property Management Promotion System



* Providing analysis results of intellectual property information, etc. that can be used for business strategies and Research and Development strategies

Education System for Intellectual Property

