

Creating a Nature-Rich Environment

Basic Environmental Guidelines

- We will promote decarbonization in our business activities and the greening of electric power by constructing offshore wind power plants, etc., to contribute to the actualization of carbon neutrality.
- We will try to communicate with local communities, and strive to develop a recycling-based society and create, conserve, and restore the environment through the development of technology related to environment and environmentally-friendly design and construction.
- We will continuously educate the employees of our company and subcontracting companies about the importance of environment conservation activities, and strive to prevent environment-polluting accidents, etc.

Our company is working on manufacturing technologies in consideration of preservation of rich global environment, in order to enhance biodiversity (diversity of ecosystems, diversity of species, and diversity of genes). To create a future in which people and nature coexist, we are conducting research and development based on the technology and experience we have acquired through various construction projects.

Efforts to Achieve Carbon Neutrality

In October 2020, the Japanese government declared that it would achieve "carbon neutrality by 2050" by setting up a favorable cycle between the economy and the environment as a pillar of its growth strategy. In response to this declaration, efforts to further promote energy conservation and the distribution of renewable energy, including offshore wind power, are gaining momentum.

In order to achieve carbon neutrality, we are promoting environmental management (strengthening governance regarding the risks and opportunities of climate change, and working toward the realization of a decarbonized society, a recycling-oriented society, and a society in harmony with nature), greening our construction business activities, and implementing green initiatives such as the construction of offshore wind farms and the conversion of buildings to ZEBs.

In July 2021, we established the Carbon Neutral Promotion Committee under the CSR Committee chaired by the Representative Director, and the CN Promotion Office as the promotion department, which is responsible for formulating action plans and monitoring the implementation status in order to contribute to the realization of carbon neutrality by 2050.

Initiatives for ZEB

We are continuing to develop energy-saving technologies for ZEB at our Institute of Technology. Post-completion energy monitoring of actual buildings that have applied energy-saving technologies has proven the effectiveness of these technologies, by confirming the achievement of ZEB conversion.

Hisamitsu Pharmaceutical Museum (2019)

Energy saving rate at design stage	Actual energy saving rate
103%	115% achieved (2019)
→ Obtained ZEB certification	120% achieved (2020)

Reinforcement of roof insulation, energy saving of air conditioning equipment, etc. → **High reduction in energy consumption**
 Operation control of facilities and equipment by installing various sensors, etc.

Placing the maximum number of solar panels on the roof. → **Generating large amounts of electricity throughout the year**



Kyowa Exeo South Kanto Branch (2020)

Energy saving rate at the design stage
75% → Acquired Nearly ZEB certification

Adoption of various energy-saving technologies → **High reduction in energy consumption**

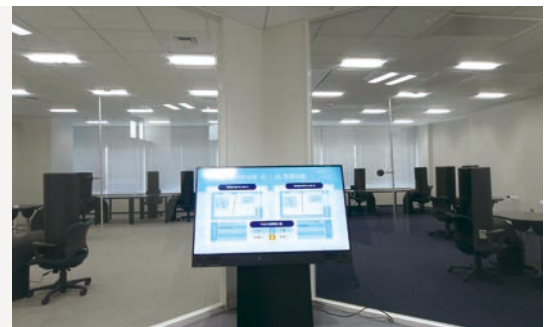
Installing an energy management system and monitoring and analyzing energy consumption during operation. → **Grasping the effects of adopted technologies and accumulating operation control technologies**



Institute of Technology Experiment Building (2019)

Energy saving rate at the design stage.	Actual energy saving rate
71% (not including energy production)	72% (2020) (not including energy production)

Efficient control of the five elements (water, air, heat, electricity, and control) → **High reduction in energy consumption**



■ Initiatives for Offshore Wind Power

In order to achieve carbon neutrality by 2050, the Japanese government has set a target of 10 GW to be powered by offshore wind generation by 2030 and 30-45 GW by 2040. In accordance with the Act on Promoting the Utilization of Sea Areas for the Development of Marine Renewable Energy Power Generation Facilities, public solicitation procedures for the selection of business operators have begun in the promotion zone in the general sea area, and the clarification of the government's target is expected to accelerate the construction of offshore wind power generation facilities.

In this business environment, we aim to become the "pioneer in the offshore wind power field" and are actively working to improve our systems in anticipation of higher demand for the construction of offshore wind power generation facilities, which is now in full swing.

<Equipment> Third Offshore Installation Vessel to be owned

- **CP-8001**

Japan's first Offshore Installation Vessel equipped with an 800-ton lifting crane

- **CP-16001**

Offshore Installation Vessel equipped with a 1,600-ton lifting crane

Currently under construction in cooperation with KAJIMA CORPORATION and YORIGAMI MARITIME CONSTRUCTION CO., LTD.

Completion scheduled for September 2022

- **The third Offshore Installation Vessel**

Planned to convert a foreign-flagged Offshore Installation Vessel by equipping it with a 1,600-ton lifting crane and registered it as a Japanese vessel

A new joint venture with DEME Offshore will own the asset

Operation start is scheduled for the spring of 2025

- **We will continue to make necessary capital investments**

<Organization> Establishment of a specialized organization to improve the structure

- **Establishment of Offshore Wind Farm Business Divisions Group (from April 2020)**

More than 70 employees to meet the growing demand for offshore power facility construction

<Accumulation of know-how> To accumulate know-how ahead of industry peers

- CP-8001 is being utilized for demolishing the offshore wind power plant off the coast of Kitakyushu and other offshore works

<Cooperation/Collaboration> Promoting alliances in technology development, etc.

- **Technical exchange with DEME Offshore and establishment of a new company**

Aiming to collaborate in the field of offshore wind power construction in Japan

DEME Offshore is a pioneer in offshore wind power construction in Europe

- **Development of low-cost technology for floating offshore wind power generation**

Joint research with TEPCO HD Corporation and the University of Tokyo

Our company is in charge of developing a rational and efficient construction method for spar-type floating structures that can cope with Japan's severe weather and ocean conditions



Removal of offshore wind turbines off the coast of Kitakyushu (CP-8001 is the vessel behind the turbines)



Conceptual illustration of the completed CP-16001

Issuance of Penta-Ocean Construction Green Bonds (5th Unsecured Bonds)

On October 14, 2020, we issued a green bond to finance the construction of an Offshore Installation Vessel equipped with a 1,600-ton lifting crane, which is currently under construction.

- Obtained "Green 1," the highest rating in the "JCR Green Bond Assessment" conducted by Japan Credit Rating Agency, Ltd.
- Obtained certification from the CBI* through JCR, an accredited verification body of the CBI, for compliance with the CBI Climate Change Bond Standard v3.0 and Marine Renewable Energy Sector Criteria.
- The world's first CBI certification to finance the construction of Offshore Installation Vessels.

*CBI: Climate Bonds Initiative
An international NGO that promotes large-scale investment in the low-carbon economy

Climate Bond Certified

Certification

This is to certify that the
5th Unsecured Straight Bonds

Issued by
Penta Ocean Construction Co., Ltd

Has met the criteria for certification by the Climate Bonds Standard Board on behalf of the Climate Bonds Initiative

Sean Kidney
SEAN KIDNEY
CEO, Climate Bonds Initiative

2 September 2020

ICMIF CALSTRS IIGCC CLIMATE WISE UNICEF UNITED NATIONS CLIMATE CHANGE SECRETARIAT CLIMATE BONDS

Creation and Maintenance of Marine Environment

We are working on the creation and maintenance of the marine environment as a measure to conserve biodiversity and combat climate change by utilizing our extensive experience and knowledge gained from civil engineering work in coastal and marine areas.

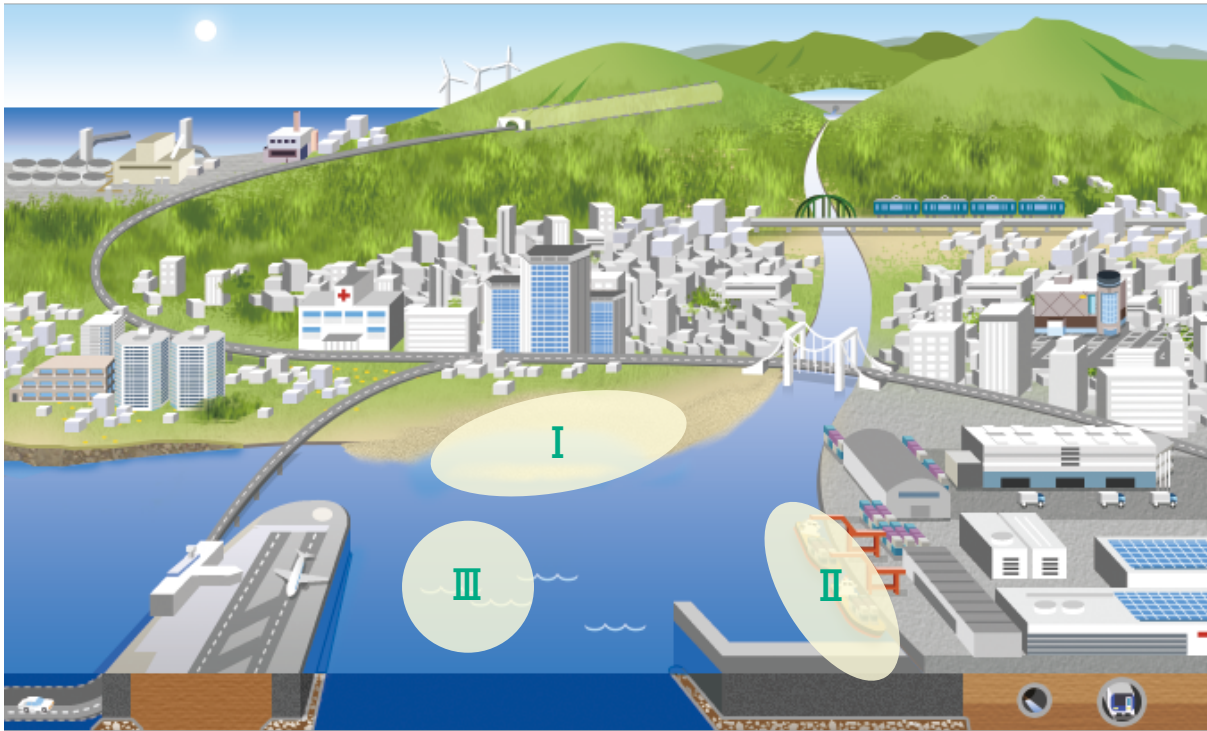
Biodiversity Conservation

Coastal areas, which connect the land and the sea, are naturally rich in biodiversity. However, around large cities, the land-sea interface is being lost and the habitat of coastal organisms is shrinking. In addition to preserving the environment of the remaining coastal areas, it is necessary to conserve biodiversity by making seawalls and other facilities as habitat-friendly as possible.

Creation and Maintenance of Marine Environment as a Measure Against Climate Change

In contrast to the carbon absorbed by plants on land (Green Carbon), the carbon taken up into the ocean by marine organisms is called **Blue Carbon**. Some reports indicate that 2.5% of the reduction required to limit global warming to 1.5 degrees Celsius can be achieved through blue carbon ecosystem absorption measures*, and expectations are being placed on the role of the ocean, including coastal environments, in combating climate change. On the other hand, a report by the United Nations Environment Programme (UNEP) warned that "blue carbon ecosystems are disappearing at a rate four times faster than the rate of tropical rainforests," making conservation an urgent issue.

*Source: "Oceans as a Solution to Climate Change" (2019, High-Level Panel on Building a Sustainable Ocean Economy)



Creation and Maintenance of Shallow Ground and Tidal Flats (I)

We are investigating the habitat of seaweed and benthic organisms in shallow areas and tidal flats constructed in front of existing seawalls using Calcia stabilized soil. We have confirmed the growth of a variety of organisms in the newly created shallow areas and their contribution to the improvement of the coastal fishing environment. We are also evaluating carbon fixation as blue carbon in tidal flats and seaweed beds.

We will continue to promote the creation of tidal flats and seaweed beds that contribute to biodiversity and carbon recycling.



Shallow ground and intertidal flat development (injection of Calcia-stabilized soil)



Shallow ground and tidal flat development progress (eelgrass growth)

Restoration of Tidal Flats (I)

In order to mitigate the impact of the construction of bridges and piers at the estuarine tidal flat on living organisms, we are working to remove the topsoil of the tidal flat before the construction and temporarily place it on land, and restore the tidal flat after the construction. We also check the restoration effect by monitoring before, during and after construction.



Temporary placement of tideland topsoil



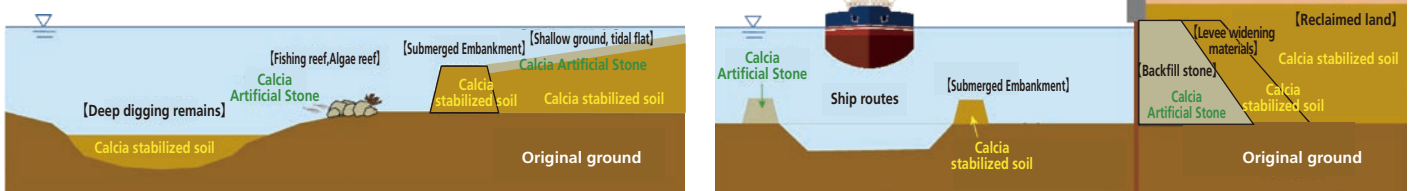
Situation after installation of bridge and restoration of tidal flat topsoil

■ Calcia Stabilizing Technology (II)

Calcia stabilizing technology improves the physical and chemical properties of dredged soil by mixing soft dredged soil generated in ports and harbors with Calcia stabilizing material generated in the process of steel making (material made by controlling the composition and adjusting the particle size of converter steel slag generated in the process of steel making), etc. The Calcia stabilized soil made by the Calcia stabilizing technology, in addition to improving the strength of soft dredged soil and ensuring its long-term durability, it has the feature of preventing and controlling the elution of harmful substances and the suppressing of turbidity. Taking advantage of these characteristics, it is used as a reclamation material, a backfill material for seawalls, and a submerged dike material to prevent the siltation in shipping routes.

Moreover, since organisms can settle more easily in Calcia-stabilized soil than in concrete, it is also used as a fishing reef and algae reef.

<Applications of Calcia stabilized soil>



<Construction technology for Calcia stabilized soil>

Among the mixing methods of dredged soil and Calcia stabilized materials, we are developing a construction technology to improve the efficiency of backhoe mixing and drop mixing. By improving the efficiency of construction, it can also contribute to the reduction of CO₂ emissions during construction.

■ Calcia Improved Soil Drop Mixing Vessel

The falling mixing method is a method to mix dredged soil and the Calcia stabilizing material to make Calcia stabilized soil by using the mixing action at the time of material falling at the transfer part of the belt conveyor. Suitable for large-scale construction of 3,000 m² or more per day.

In order to enable efficient construction, we have built a reclaimer vessel (a work vessel that discharges dredged soil to a reclaimed site by a belt conveyor) equipped with a supply hopper, a supply conveyor, and a conveyor for dropping and mixing the Calcia stabilizing material, and are adopting it to actual construction work.



■ Calcia Mixing Bucket

Backhoe mixing is a suitable method for the construction of small and medium-sized project using Calcia stabilized soil, and the use of a Calcia mixing bucket with a three-layer mesh screen allows for the efficient and high-quality production of Calcia stabilized soil.

Based on our construction results to date, we have confirmed that the mixing time can be reduced by about 40% when using the Calcia mixing bucket compared to the normal bucket.

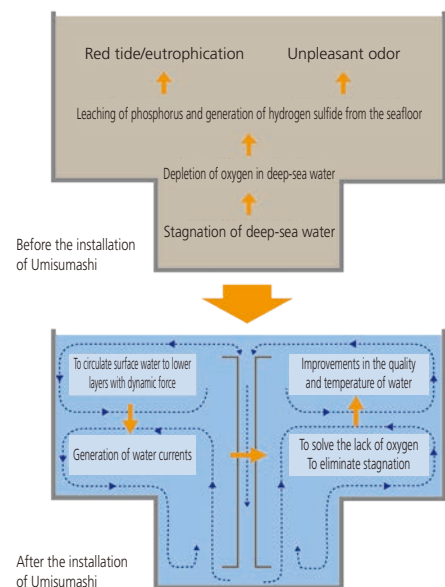


■ Water Purification (III)

By generating water currents with dynamic force, Umisumashi eliminates the stagnation of water flow near the seabed, restores dissolved oxygen, and reduces the elution of nutrients that cause eutrophication and sulfides that are harmful to benthic organisms. It is also effective in improving water temperature by stimulating heat transfer through mixing of surface water and bottom water.



Umisumashi



Recycling Business

Construction-generated Soil and Sludge Recycling Business

- Ichikawa Soil Recycling Center
- Yokohama Soil Recycling Center
- Nagoya Soil Recycling Center

Overview of the business

This business operates Soil Recycling Centers (in Ichikawa, Yokohama, and Nagoya) that perform accumulation, intermediate treatment, and shipment of generated soil in order to reuse construction soil, contaminated soil, and construction sludge generated in the Kanto and Chubu regions over a wide area.

Characteristics of the business

- To reduce the transport distance of trucks by making the most of our positional superiority in the Kanto and Chubu regions.
 - To accept sediment 24 hours a day.
 - Mass transportation by large ships is possible using a quay that can accommodate up to 10,000-ton class ships.
- ➔ **High cost competitiveness** for transporting large volumes of generated soil in urban areas

Nationwide Recycling Operations Network



Image of the wide area use of construction sludge

Land transport
(soil excavation, shield factory, off-site removal)

Normal construction

Transport construction sludge outside with a dump truck

Polluted soil excavation

Transport polluted soil outside (landfill disposal) with a dump truck

Sludge removal work (shield tunnel, etc.)

Discharge of construction sludge from the site by tank trucks, etc.

Nagoya Soil Recycling Center
(accumulation, intermediate treatment, and shipment of construction sludge)

Construction soil is stored in an outdoor yard and moved by a belt conveyor.

Intermediate treatment and storage of contaminated soil indoors, and transportation of contaminated soil from the indoor area by a belt conveyor

Intermediate treatment and storage of construction sludge indoors, and transportation of construction sludge from inside by a belt conveyor

Marine transport (marine transport, wide area use)

Mass transport by ship, wide area use

- Landfill facility (landfill disposal)
- Cement manufacturing facility (used as raw material)
- Purification facility (used as purified soil)
- Landfill development site (used as landfill material)



Ichikawa Soil Recycling Center



Yokohama Soil Recycling Center



Nagoya Soil Recycling Center

- Sendai Ecoland

Overview of the business

This business improves (granulates and solidifies) inorganic sludge* generated from construction and mining work and recycles it as construction material "Simarussa" (reconditioned sand).

*Sludge that cannot be used as is, such as construction sludge mixed with cement or bentonite or with a high water content ratio.

Characteristics of the business

- Granulation and solidification of construction sludge with high moisture ratio in a few minutes
- **No need for pre-treatment** such as dewatering and drying when granulating and solidifying construction sludge.
- No water pollution, no noise, no vibration, no dust, etc.
- Simarussa (reconditioned sand) is **strong enough to be used as a civil engineering material.**



Before treatment



After treatment

*This business is conducted by JAIWAT Co., Ltd. (our wholly owned consolidated subsidiary)

Paper Sludge Incineration Ash Recycling Business (Sodegaura Ecoland)

Overview of the business

This business manufactures a water-absorbing mud stabilization material "Watoru" made from paper sludge incineration ash discharged from papermaking companies, and supplies it for construction.

The water-absorbing mud stabilization material "Watoru" is a hydration-treated product made by mixing a special chemical with incinerated ash from paper manufacturing sludge generated by papermaking companies. In addition to physical reforming through water-absorbing (with an instantaneous reforming effect), it also has chemical reforming ability over time (with gradual strength development).

It is highly effective not only for processing dredged soil in harbors, rivers, and lakes, but also for processing mud and sludge generated by excavation on land.

Because this material absorbs (in Japanese, taking, or "toru") water from mud, we have named the product "Watoru" ("water taking").

*Technical evaluation/patent
Ministry of Land, Infrastructure, Transport and Tourism, New Technology Information System (NETIS) Registration Technology (Registration No. TH-160010-A)



Panoramic view of the facility

Features of "Watoru"

- High water absorbency : Has an immediate effect, reforming sludge into soil in a few days.
- Deodorant effect : Quickly deodorizes bad odors such as hydrogen sulfide odor of dredged soil.
- Neutralizing and solidifying material : The reformed soil is weakly alkaline and becomes more neutral over time.
- Safety : Treated with a chemical using special chemicals and is not hazardous.



Water-absorbing mud stabilization material "Watoru"



Instantly reforms mud



Before treatment with Watoru



After treatment with Watoru

*This business is conducted by JAIWAT Co., Ltd. (our wholly owned consolidated subsidiary)

Food Waste Recycling Business (Miki Composting Center)

Overview of the business

This business processes and sells compost materials made from organic waste discharged from food-related companies, etc.

Characteristics of the business

- With the automatic agitator (scoop-type) and the forced air circulation (aeration), collected food waste is subject to primary fermentation for about 1 month, and then further fermentation and maturation for about 3 months to produce complete compost.
- Since the Miki Composting Center is located near the Hanshin district with concentration of many food-related companies and easily accessible from interchanges of the expressway, it can contribute to the reduction of waste transport costs.

Use of recycled product (compost "Minami-No-Hikari")

- Because it is made from food waste, it is a safe and nature-friendly organic compost.
- Fully matured after four months of fermentation and aging, there is no unpleasant odor.
- Fully meets the quality standards of the NPO Japan Bark Compost Association, surpassing common composts. It can be used in various situations from full-scale agriculture to landscaping/greening projects and kitchen gardens.
- The performance of our recycled products has been highly evaluated, and our product delivery record is improving.



Inside the facility



Panoramic view of the facility



Product "Minami-No-Hikari"

*This business is conducted by Miki Biotech Co., Ltd. (our wholly owned consolidated subsidiary)