Creation of a Rich Environment

Basic Environmental Guidelines

1. We shall contribute to a recycling-oriented society and preserve the natural environment by taking measures to reduce global warming.
2. We shall prevent environmental accidents.
3. We shall enhance mutual communication with local communities and conduct eco-friendly design and construction, while developing technologies to preserve and restore the environment.
4. We shall communicate with all our stakeholders to enhance their awareness of the importance of environmental preservation.

Environmental Initiatives

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.

Effective Use of Soft Dredged Soil (Calcia Reforming Technology)

Calcia reforming technology improves the physical and chemical properties of dredged soil by mixing the soft dredged soil generated from the port works with the calcia reforming material (materials for controlling the composition and adjusting the particle size of steelmaking slag from converter system) generated in the steelmaking process.

The Calcia reformed soil made by the Calcia reforming technology can be widely applied in marine constructions such as landfill material, partition embankment material, revetment backfill material, and marine embankment material for repairing route burial. It is expected to shorten the construction period and reduce costs.

Our company has developed a high-performance Calcia reforming technology using short fibers and mud improvement materials and is working on dredged soil recycling at ports.

Overview of the Calcia Reforming Technology

The reformed soil can be used in a wide variety of applications including landfill material, levee widening material, embankment material, filling material, etc.

Construction of Calcia Drop-Mixer Vessel

As attention towards a recycling-oriented society increases, there are various plans underway to apply the Calcia reforming technology to utilize dredged soil in reclamation work and other such projects.

To meet those needs, our company has remodeled an existing reclaimer vessel* and equipped them with a system for feeding Calcia reforming material. This is our "Calcia Drop-Mixer" which enable us to obtain the prescribed mixing quality for the resultant material on board.

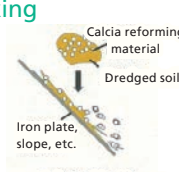
*Reclaimer vessel: A work vessel used in coastal reclamation etc. This vessel unloads soil and sand (via a backhoe or similar equipment) transported by a soil carrying vessel, and discharges it to landfill sites via a conveyor or the like.
*This vessel is co-owned with Kanmon Kowan Construction Co., Ltd.

Concept

☐Supports large-scale construction (2,500 to 4,000m^3)
☐Mixing is completed when dropped from the Calcia Drop-Mixer vessel
☐Enables real time quality control (mixing ratio, density, etc.)

Principles of Drop-Mixing

Dredged soil and Calcia reforming material are mixed when down dropped from a conveyor belt or a spreader and collided with an iron plate or a slope or the like.



Schematic diagram of the mixing system

Proven in "Port of Nagoya Motohama Pier Reclamation Work."
Landfill area: 8.5ha
Reformed soil volume: 470,000m^3
(140,000m^3 mixed by drop-mixing method)

Soil unloading capacity	1,500m^3
Boom length, work delivery device height	50m from the ship's side, 12.9m (10°) from sea level
Hull dimensions	L55m×B22m×H4m Draft 2m
Spud	850mm×850mm×19.50m Effective water depth 10m (2 stakes)

Backhoe bucket capacity	11.6m^3 (PL)
Dredged soil hopper	40m^3 with vibration sieve
Dredged soil belt feeder	with measuring instrument (1 unit)
Calcia Hopper	15.0m^3
Calcia supply conveyor	600t/h, 3 units, 1 measuring instrument
1st conveyor, 2nd conveyor, boom conveyor	2,000t/h for each

Awards and Technical Evaluation

"Calcia reformed soil"

- Received the 19th National Land Development Award (in 2017)
- NETIS registration CKB-150001-A
- Ministry of the Environment Environmental Technology Demonstration Project 090-0901
- Basic certification for a restoration technology for the environment in fishing areas (Japan Fisheries Science and Technology Association) No. 26001

"Fiber-reinforced Calcia reformed soil"

- Obtained the technical evaluation certificate (No. 17001) from Coastal Development Institute of Technology (in 2018)

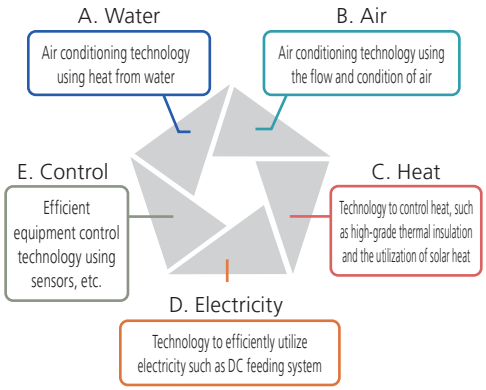
ZEB (Zero Energy Building) Initiative

Energy Saving Renovation for the Experimental Exhibition Building in the Institute of Technology

The experimental exhibition building in the Institute of Technology in Nasushiobara City, Tochigi Prefecture was renovated to energy-saving specifications and has begun operation.

For the empirical research on ZEB technology, the renovation's main concept is to maneuver five factors listed below. We adopted about 30 old and new technologies arranging and fusing them in the building, and are expecting energy saving rate of 72% (excluding energy creation).

The newly renovated experimental exhibition building will be a place where you can experience our company's ZEB technology. Along with giving us the ability to verify the operational effectiveness of the newly introduced ZEB energy saving technologies, the building will be widely utilized for research and development related to ZEB energy saving and indoor environmental technology, as well as for design and technical proposals to customers.



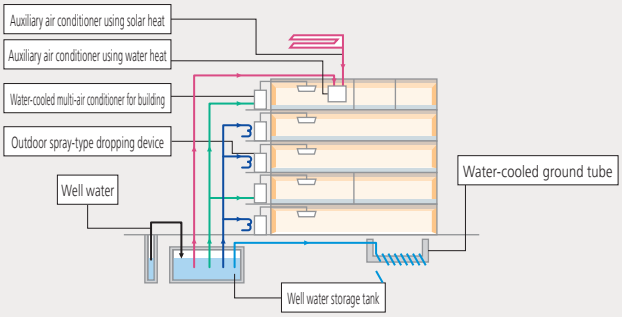

Appearance of the Institute of Technology


Inside of the Institute of Technology (experimental exhibition building)

Maneuvering Heat

Construction of an air conditioning system utilizing geothermal and solar heat from well water

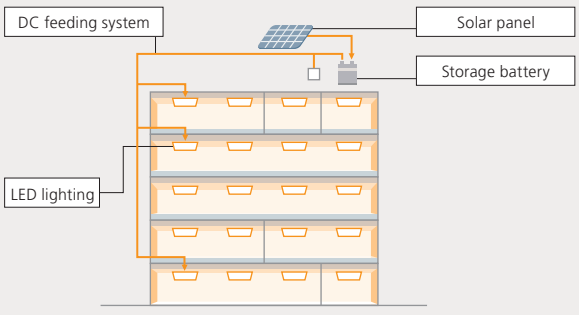
For air conditioning systems, we utilize geothermal heat, whose temperature is constant throughout the year. We are using the well water pumped from underground to improve the efficiency of water-cooling air conditioners and air-cooling air conditioners. In winter, well water is used for auxiliary heating equipment that utilizes a solar heat collector.



Maneuvering Electricity

Construction an efficient lighting system utilizing energy saving technology

We have built an efficient lighting system by combining roof-top solar panels, DC feeding system that enables highly-efficient electrical supply, and LED lighting that can ensure high illuminance with low power consumption.



Achieved an Energy Saving Rate of 115% at Hisamitsu Pharmaceutical Museum

Hisamitsu Pharmaceutical Museum, which acquired "ZEB" certification in 2019, set the energy saving rate at 103% at the time of design including energy creation. But, through one full year of energy monitoring, the actual value of the energy saving rate exceeded the expected rate, reaching 115% and confirming the achievement of the "ZEB."

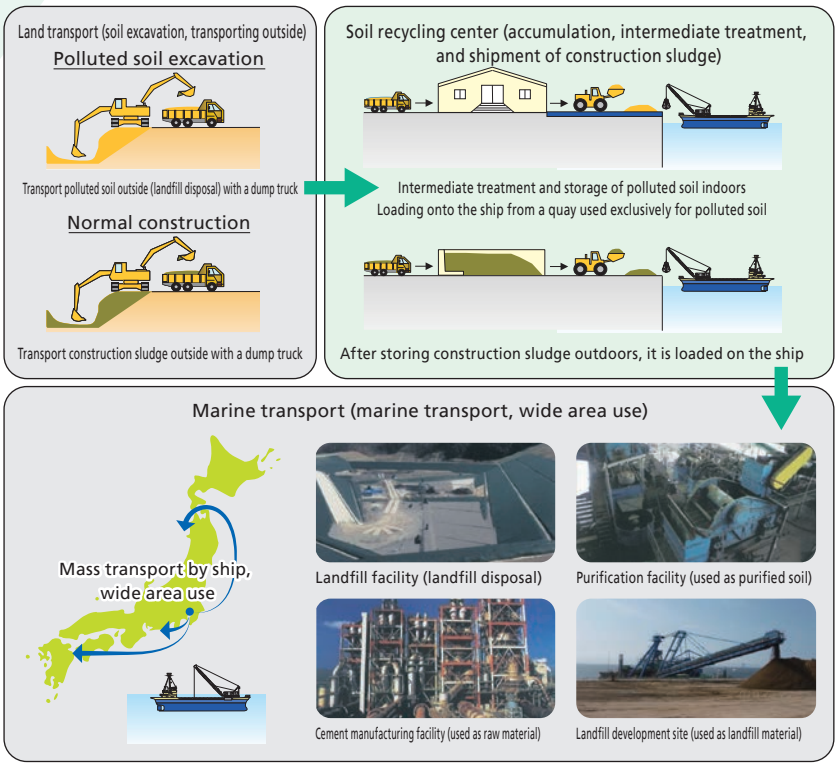
We will continue to promote research and development of ZEB energy saving technologies to meet the needs of our customers and contribute to the realization of a decarbonized society.

Recycling Business

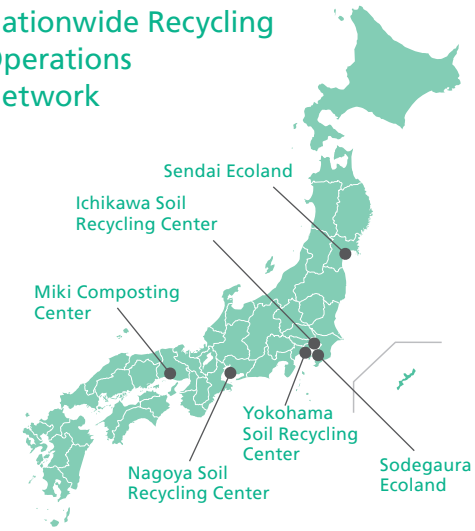
Construction-generated Soil Recycling Business

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

Image of the wide area use of construction sludge



Nationwide Recycling Operations Network



Overview of the business

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

Characteristics of the business

- Helps reduce the transport distance of trucks by making the most of our positional superiority in the Kanto and Chubu regions.
- Adopts a 24-hour acceptance system.
- Allows mass transport by a large ship using of the quay which can dock up to a 10,000t class ship.


Ichikawa Soil Recycling Center


Yokohama Soil Recycling Center


Nagoya Soil Recycling Center

Construction Sludge Recycling Business (Sendai Ecoland)

Overview of the business

This business promptly processes inorganic sludge from construction work and drilling work (certain type of sludge which cannot be reused, such as cement-bentonite mixture, construction sludge having a high moisture ratio, etc.) into construction material "Shimarussa (reconditioned sand)."

Characteristics of the business

- Since construction sludge, which is industrial waste, goes through the granulation and solidification process without pretreatment (dewatering, drying, etc.), water pollution, noise, vibration, dust, etc. never occur, preventing any impact on the surrounding environment.
- Construction sludge having a high moisture ratio can be granulated and solidified in just a few minutes.

Use of recycled product "Shimarussa (reconditioned sand)"

Since the treated soil has sufficient strength with properties of high-quality sand and gravel, it can be used as civil engineering material.

Main construction projects that generate sludge

- Shield work, propulsion work
- Foundation construction work
- Dredging work
- SMW, continuous wall construction
- Soft ground excavation, etc.


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)

Manufacturing Water-absorbing Stabilization Material "Watoru"

This business manufactures a water-absorbing mud stabilization material "Watoru" made from paper sludge incineration ash (PS 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 PS ash generated by papermaking companies. In addition to physical reforming through water-absorbing (with an instantaneous reforming effect), it also presents 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, "toru") water from mud, we have named the product "Watoru" ("water toru").

*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.

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)