

Materiality: Establishment of Recycling-Oriented Society



As a global citizen that manufactures construction and industrial machinery and environment-related equipment, the Nikko Group acknowledges that the preservation of the global environment is one of its top priorities. Under the basic principle of prioritizing the environment, we offer a wide range of products and solutions designed to help recycle industrial waste in order to contribute to the development of a recycling-oriented society.

For details of the Nikko Group's environmental policies, please visit our website: <https://www.nikko-net.co.jp/sustainability/environment.html>

Promote activities to reduce the environmental burden

The Nikko Group works to advance waste reduction and recycling, in addition to promoting the conservation of resources and energy, to reduce the environmental burden as much as possible.

Trend in industrial waste volume and breakdown by type

Breakdown		Recycled or not	Unit	FY2020	FY2021	FY2022	FY2023	FY2024
Paper scraps	Paper		bag*	1,897	2,049	2,580	10,000	10,000
Metal scraps	Scraps	○	kg	1,668,980	1,604,900	1,820,320	1,571,170	1,610,380
	Shavings	○	kg	120,960	139,840	150,580	126,550	122,650
	Gas cutting slag, scales	○	kg	61,200	43,420	38,650	41,250	29,650
	Tin can	○	kg	19,960	22,430	24,040	19,800	19,580
	SUS scraps, electrical wire scraps	○	kg	39,530	38,530	28,130	29,520	44,540
Industrial waste	Wood chips		m³	332	368	370	336	267
	Plastic waste		kg	3,020	20,649	13,265	13,050	15,480
	Construction waste		m³	75	72	77	92	103
	Floor sand		t	10	12	13	11	10.5
	Non-combustibles		m³	0	2	3	1	1

*One bag weighs about 2 kg.

Trend in water consumption

Breakdown	Unit	FY2020	FY2021	FY2022	FY2023	FY2024
Water supply	m ³	9,155	9,413	10,107	9,969	8,726

Develop and spread products that contribute to the establishment of a recycling-oriented society

Since the 1970s, the Nikko Group has been working on the development of plants designed to recycle construction and road waste materials in order to reduce the environmental burden, thereby contributing to improving resource productivity and establishing a recycling-oriented society. In recent years, with the technology for the recycling of concrete sludge in practical use, we have been aiming to curb and minimize industrial waste. Furthermore, we have developed facilities and equipment that recycle waste to reduce the environmental burden and create value (e.g., a system for collecting metal resources with a view to making effective use of urban mines), contributing to the establishment of a sustainable society.

① Development of sludge recycling equipment for the ready-mixed concrete industry and product launch

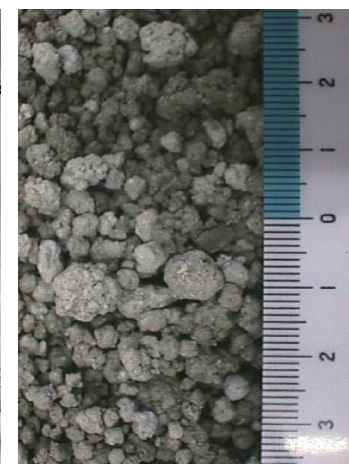
The Nikko Group receives orders for sludge recycling equipment while it keeps working on the development of products in the same line to make effective use of concrete sludge, which is waste from the processes of manufacturing ready-mixed concrete and concrete products. This equipment is a system that blows CO₂ emitted from boilers into sludge water to induce a neutralization reaction so that the sludge is recycled as calcium carbonate. It is designed to recycle carbon and reduce waste at the same time. The product is attracting attention as a solution that meets customers' need for green equipment, and that follows the trend towards decarbonization.

● What is concrete sludge?

Concrete sludge is a waste material in water from the washing of concrete mixer trucks that have transported ready-mixed concrete. It is industrial waste from ready-mixed concrete plants. Concrete sludge contains a lot of sand and cement and cannot be disposed of as it is, so it goes through the process of dehydration and drying before it is discarded. It is mandatory to dispose of concrete sludge in a controlled landfill site. In recent years, however, it has become increasingly difficult to dispose of it because of the difficulty of securing a waste disposal site and of rising disposal cost.



Concrete sludge as industrial waste



Concrete sludge for reuse as a recycled roadbed material

Progress of development and delivery

During the last fiscal year, we delivered and brought into operation the core equipment shown on the right.

- **Elution** tanks for extracting useful content from concrete sludge
- **Crystallization** tanks for blowing in CO₂ emissions to induce neutralization and crystallization

During this fiscal year, we delivered equipment designed to process a reactant separated through a crystallization tank (dehydrated cake) to recycle the substance as a dried granular product. The process is as shown on the right.

1. Depositing air-dried cake

Sun-dried cake-shaped material is fed into the hopper.

2. Force-drying

The cut raw material is forcibly dried using a dryer.

3. Processing exhaust gas and collecting the product

The particles scattered into exhaust gas are captured using a cyclone separator and a bag filter and collected as a powder product.

4. Recirculation drying process

Solid matters that remained undried after exposure to the drier are pulverized with a crusher and fed into the drier again. This is how they are completely dried in a short time.

This whole process has made it possible to stably produce a granular product that contains less water than prescribed, even from dehydrated cake that is hard to dry.

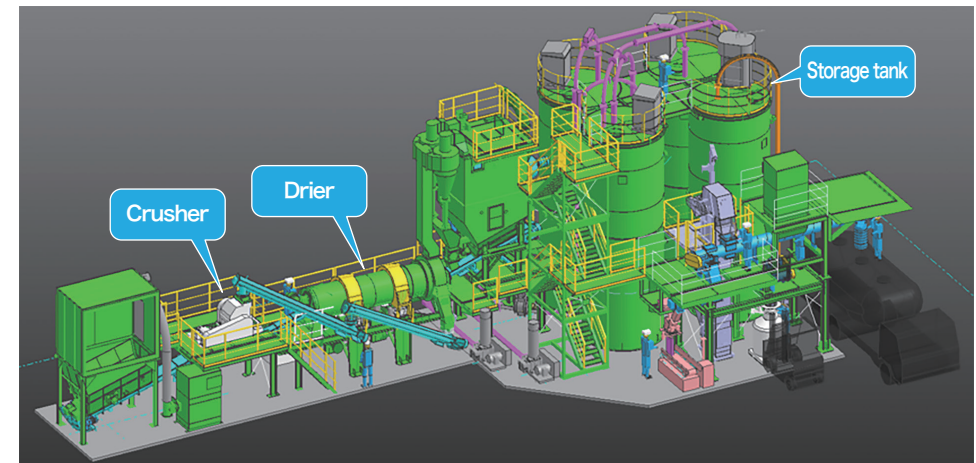
Outlook

We plan to offer the product as a building material made by immobilizing CO₂ after product quality assessments by customers. We envisage that offering this product will facilitate the introduction of materials geared to decarbonization in the construction industry, and that the product will be used across plants that manufacture secondary concrete products throughout Japan.

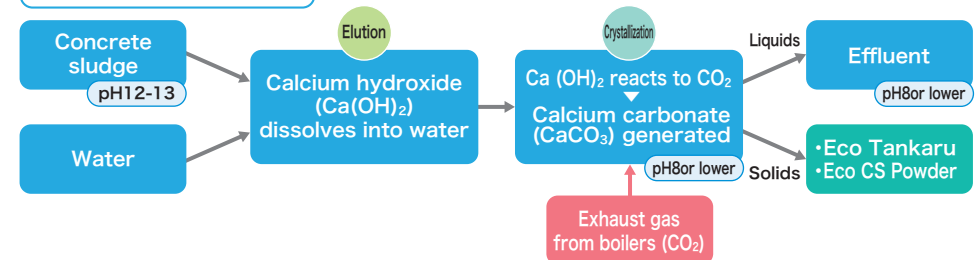
② Recycling of metal resources in urban mining

Metal resources in the earth are mined to make building materials, electronics, and other products, accumulating in people's living space. Urban mining is the idea of effectively reusing these resources. In recent years, accumulations of mined metals are said to be larger than proven and probable underground resources. The effective use of urban mines has become increasingly important for sustainable recycling. Nikko has developed and commercialized an AI image analysis system for collecting and sorting metal resources from used small home appliances and other similar items. In this system, AI performs real-time analysis of images captured by the camera to automatically sort out material that contains metal from minute fragments. The system has dramatically improved sorting accuracy and work efficiency compared to the conventional way of sorting that relies on human eyes and handwork, contributing also to fewer human errors.

Concrete sludge recycling facilities



Manufacturing process



Metal resource collection and AI image analysis system for sorting

Processing flow of AI'll be sorter separation system based on AI image recognition developed by Nikko

