

# Environmental Report 2023

Aiming to coexist in harmony with the natural environment



Amano Enzyme Inc.

※This is a machine translation of  
the Japanese environmental report.

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## About the Environmental Report 2023

### Editorial Policy

This report presents a compilation of data on the environmental protection activities undertaken by Amano Enzyme Ltd on a company-wide basis.

### Target Period

The period covered by this report is 1 April 2022 - 31 March 2023.

### Target Organization

The organizations covered by this report are Nagoya Plant, Yoro Plant, Shiga Plant, Innovation Centre and Head Office.



Upper left:  
Nagoya Plant  
Upper right:  
Yoro Plant  
Left: Shiga Plant

## About Us

Company Name	Amano Enzyme Inc.
Established	August 26, 1948
Found	1899
Representative	President and CEO Motoyuki Amano
Business Activities	1. Manufacture and sale of enzyme agents for the pharmaceutical, food, and manufacturing industries, and for diagnostic reagents 2. Manufacture and sale of pharmaceuticals, veterinary medicines, and feed additives
Capital	¥390 million
Employees	440
Locations	2-7, 1-Chome, Nishiki, Naka-ku, Nagoya 460-8630 Japan
Phone	81-(0)52-211-3032
FAX	81-(0)52-211-3054

## Environmental Policy

In accordance with its philosophy of tomoiki (harmonious coexistence), Amano Enzyme is dedicated to business activities that promote the sustainable growth and development of society.

As a leading force in the enzyme industry, we strive for global environmental protection by assessing the impact of our development, procurement, manufacturing, distribution, and services as precisely as possible.

1. We comply with all applicable environmental laws and regulations, and accords with local communities.
2. We strive to help preserve the global environment through new technologies and increased efficiency.
  - (1) We reduce greenhouse gas emissions across whole life cycles
  - (2) We reduce energy consumption and promote renewable energy use
  - (3) We reduce consumption of non-renewable resources through waste reduction and recycling
  - (4) We maximize productivity through effective use of natural resources
3. We promote systematic and continuous environmental conservation activities by informing all employees about our environmental policy and operating an environmental management system.
4. We build enduring partnerships with customers, suppliers, and local communities to promote more effective environmental conservation activities.

April 1, 2022

Motoyuki Amano, Amano Enzyme Inc.

## Status of acquisition of environmental management systems

Amano Enzyme has obtained ISO 14001 certification since January 2000 as a mechanism for promoting environmental improvements at the Nagoya, Yoro and Shiga plants, which are production sites, the Innovation Centre, which is the R&D site, and the head office, and has been promoting continuous environmental protection activities. Activities based on ISO 14001:2015 started in FY2017, and the company underwent a maintenance audit in November 2022 and received certification.

## Environmental management organisation and internal environmental audits

To ensure the effective operation of the environmental management system, the EMS Committee and the Environmental Committee have been established as operating organisations, and their responsibilities, authorities, roles and functions are clearly defined and addressed in their activities. In addition, internal environmental audits are regularly conducted every year to ensure that the environmental management system is being implemented. With the transition to ISO 14001:2015, internal environmental auditors were retrained and the number of auditors was increased. We are continuously improving our auditors to ensure that internal environmental audits are carried out effectively after the transition.

## 2022 Environmental targets and results

Amano Enzyme continuously implements initiatives to reduce the environmental impact of its corporate activities and to protect the global environment. The company carries out detailed environmental conservation and management activities by setting medium-term environmental targets and implementation plans with three years as a unit, and formulating targets and plans for implementing these targets and plans for each single year.

Environmental policy	2022 Environmental goals and results	
	Target	Track record
Compliance with regulations, etc.	<ul style="list-style-type: none"> <li>■ Clarify applicable environmental laws, regional agreements, etc. at each site and regularly evaluate them to ensure compliance with legal and agreed values.</li> <li>■ At sites with wastewater treatment facilities, comply with legal limits and voluntary control limits (additional limits) based on the 8th Total Volume Regulation by ensuring operation and management.</li> <li>■ Comply with legal limits for odour, noise, vibration, etc. and avoid generating environmental complaints.</li> </ul>	<ul style="list-style-type: none"> <li>■ Inspections and notifications based on applicable laws, regulations and agreements were reliably carried out as planned, and compliance with laws and regulations was regularly assessed. The target was achieved with zero cases of non-compliance with laws and regulations.</li> <li>■ In wastewater treatment, the legal limit values based on the 8th Total Volume Regulation were observed. 0 exceedances of legal limits (but 3 exceedances of voluntary limits due to problems) Strengthen equipment maintenance and operational management to prevent recurrence.</li> <li>■ One odour and noise complaint each due to equipment problems.</li> </ul>
Conservation of the natural environment and protection of natural resources	<ul style="list-style-type: none"> <li>■ Improve unit energy consumption by at least 3% by the end of FY2021 compared to actual energy consumption in FY 2019.</li> <li>■ Reduce CO2 emissions per unit of production by at least 50% by the end of FY2031, compared to the actual CO2 emissions per unit of production in FY 2019.</li> <li>■ Improve unit water consumption by at least 3% by the end of FY2021 compared to the FY2019 actual level.</li> <li>■ Prevent CFC leakage from CFC equipment and reduce CFC (CFC, HCFC) use to zero.</li> <li>■ Reduce the amount of industrial waste per unit of production to less than or equal to the actual amount of industrial waste per unit of production in FY 2019.</li> </ul>	<ul style="list-style-type: none"> <li>■ Energy intensity FY 2019 ratio: 107% Target achieved.</li> <li>■ CO2 emissions intensity FY 2019 ratio: 102%</li> <li>■ Unit water consumption FY 2019 ratio: 104% Target achieved.</li> <li>■ Calculated leakage of CFCs: 80.3 t-CO2/year</li> <li>■ Industrial waste generation per unit of production is FY 2019 ratio: 91% Target achieved.</li> </ul>
Continuous improvement	<ul style="list-style-type: none"> <li>■ Reduce environmental impact by improving operational efficiency.</li> <li>■ Actively promote activities to improve proposals that lead to energy savings, particularly in the summer months (July and August) when electricity demand is high.</li> <li>■ In research and development, promote product and application development themes that contribute to reducing the environmental impact of customers.</li> </ul>	<ul style="list-style-type: none"> <li>■ Continued efforts to improve operational efficiency through improvement proposal activities, small group activities, etc.</li> <li>■ Continuous implementation of energy-saving proposal activities. Selection of high-efficiency types when updating equipment such as air-conditioning and refrigeration units.</li> <li>■ Re-evaluation of enzymes to be produced is underway for promising candidate strains with potential to reduce environmental impact.</li> </ul>
Communication	<ul style="list-style-type: none"> <li>■ Ensure communication with the local community (sharing information on odours, noise, construction work, etc., holding plant briefings and plant tours, etc.) and maintain a relationship of trust.</li> <li>■ Cooperate in environmental beautification activities and resource collection in the vicinity of the plant as part of community contribution activities.</li> </ul>	<ul style="list-style-type: none"> <li>■ Monthly dissemination of information on predicted odour emissions to nearby residents (Nagoya plant).</li> <li>■ Plant briefings and plant tours to local authorities were cancelled due to Corona (Yoro plant).</li> <li>■ Beautification of areas around offices (all offices).</li> </ul>



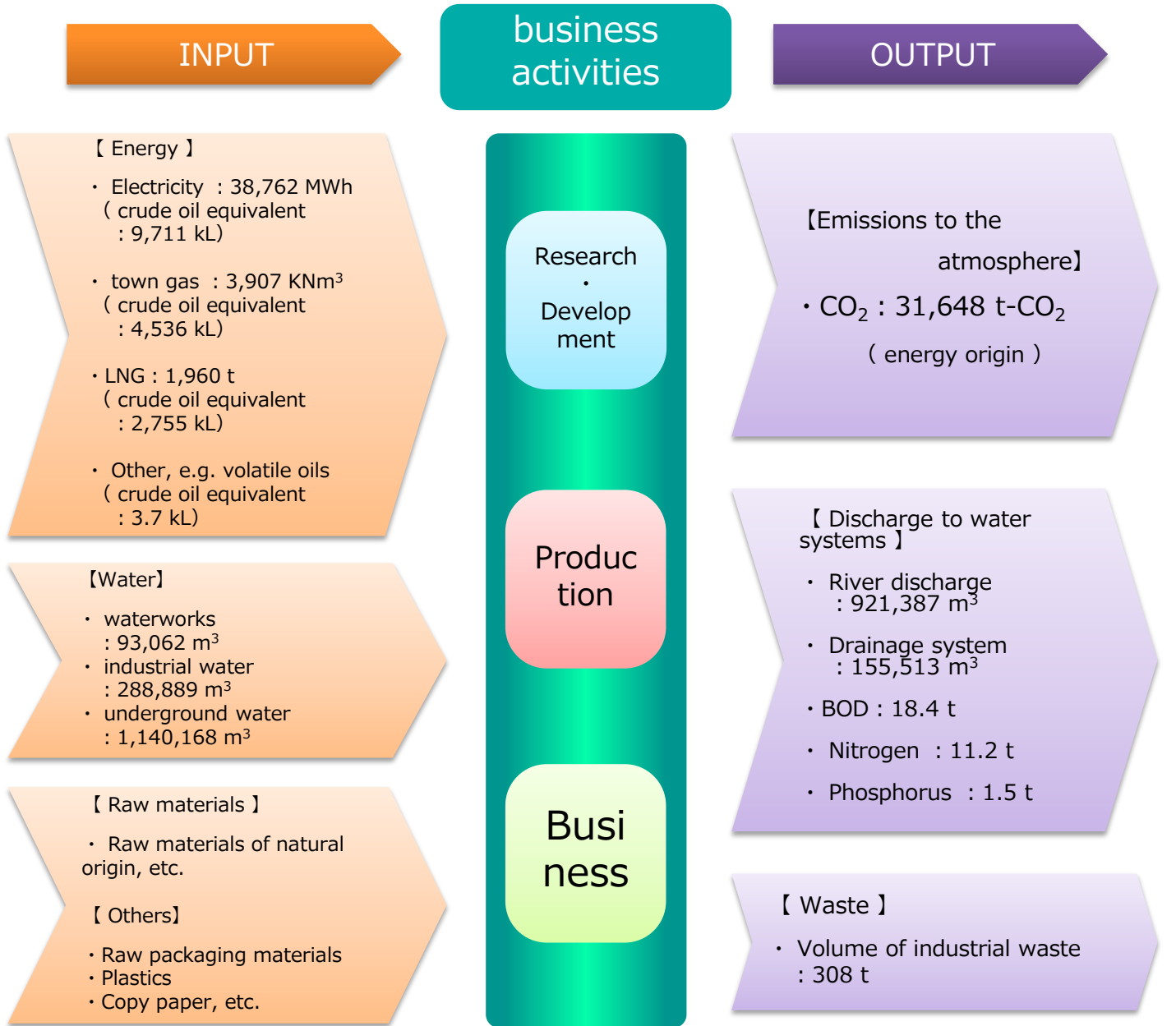
## Achievements of activities inside and outside the establishments

The table below shows Amano Enzyme's EMS activities both inside and outside its sites and its performance in complying with various laws, regulations and ordinances in FY2022.

2022	Apr.	<ul style="list-style-type: none"> <li>■ FY2022 Establish environmental targets and implementation plans and start EMS activities (each business site and each site)</li> <li>■ FY 2021 Conduct regulatory compliance assessments and confirm legal compliance (each business site).</li> <li>■ FY2022 Report and pay pollution load levy (Nagoya, Yoro and Shiga plants)</li> <li>■ FY2022 Submit report on private industrial water supply (Nagoya Plant)</li> </ul>
	May	<ul style="list-style-type: none"> <li>■ Reviewed and revised environmental impact assessments and environmental impact registers for each business site and site. Submitted energy consumption statistics surveys (Nagoya, Yoro and Shiga Plants).</li> <li>■ Submitted a global warming countermeasures implementation status report and a survey sheet on the pollution load of specific discharged water (Nagoya Plant).</li> <li>■ Submission of business action plans and reports under the Shiga Prefecture Ordinance on the Promotion of the Creation of a Low Carbon Society (Shiga Plant).</li> <li>■ Submission of a general waste reduction plan and a report on the results of the waste reduction plan (Yoro Plant).</li> <li>■ Submission of business waste reduction plan (Head Office)</li> </ul>
	Jun.	<ul style="list-style-type: none"> <li>■ Report the results of EMS activities at each site in FY 2021 to the Chief Environmental Management Officer</li> <li>■ Submit industrial waste treatment plans, implementation status reports and status reports on the delivery of industrial waste management charts, etc. (Nagoya, Yoro and Shiga Plants)</li> <li>■ Submission of industrial waste management chart delivery status reports (Innovation Centre).</li> <li>■ Submission of reports on the status of delivery of industrial waste from outside the prefecture (three plants and Innovation Centre).</li> <li>■ Submission of survey sheets on the amount of waste generated (Yoro plant, Innovation Centre).</li> </ul>
	Jul.	<ul style="list-style-type: none"> <li>■ Conducted internal environmental audits (July).</li> <li>■ Submission of air pollutant load survey sheet (Nagoya Plant) Submission of medium- and long-term plans and periodic reports based on the Energy Conservation Law.</li> <li>■ Submitted a report on the water quality results of the Konan City Environmental Conservation Agreement (Shiga Plant).</li> </ul>
	Aug.	<ul style="list-style-type: none"> <li>■ Conducted accident and emergency response simulation drills at each site.</li> <li>■ Submission of global warming countermeasure implementation status report (Nagoya Plant).</li> <li>■ Submitted a report on changes in the use of sewage treatment facilities (Innovation Centre).</li> </ul>
	Sep.	<ul style="list-style-type: none"> <li>■ Conduct surveys on the use of toxic and deleterious substances and carry out management inspections (three plants and the Innovation Centre).</li> </ul>
	Oct.	<ul style="list-style-type: none"> <li>■ First half of FY2022 Prepare EMP (Environmental Management Program) performance report (each business site and each site)</li> <li>■ First half of FY2022 Conduct legal compliance assessment and confirm legal compliance (each site at each operation)</li> </ul>
	Nov.	<ul style="list-style-type: none"> <li>■ Underwent ISO 14001 renewal audit.</li> <li>■ Submission of a comprehensive air pollutant emissions survey sheet (Shiga Plant).</li> </ul>
	Dec.	(Activity performance report N/A)
	2023	Jan.
Feb.		<ul style="list-style-type: none"> <li>■ Environmental targets and implementation plans for FY2023 were formulated and EMS activities commenced (at each business site and each site).</li> <li>■ Notification of industrial waste transport outside the prefecture submitted (Yoro Plant, Innovation Centre).</li> </ul>
Mar.		<ul style="list-style-type: none"> <li>■ FY2022 Conduct usage surveys on Class I and specified Class I designated chemical substances (3 plants and Innovation Centre).</li> <li>■ Conduct usage surveys and management inspections of toxic and deleterious substances (3 plants and Innovation Centre).</li> </ul>

# Environmental impact of business activities

At Amano Enzyme, the Nagoya, Yoro, Shiga and Innovation Centres, as well as the head office, we are engaged in a comprehensive range of activities, from research and development to production and administrative activities. Each and every employee is aware of the inputs and outputs of environmental impact generated by these activities, and strives to reduce environmental impact by taking concrete action.



Research · Development



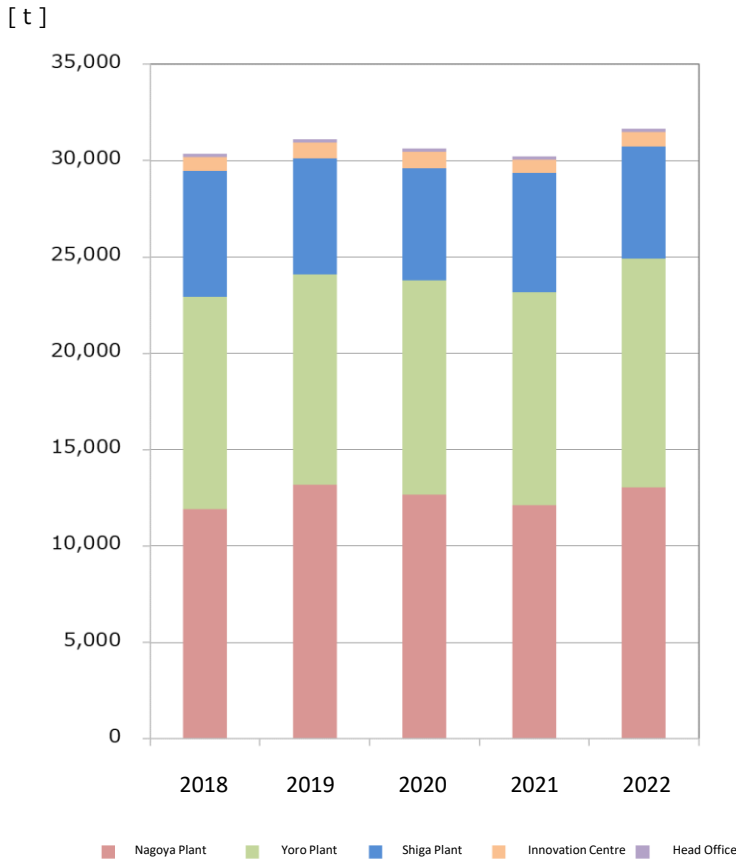
Production



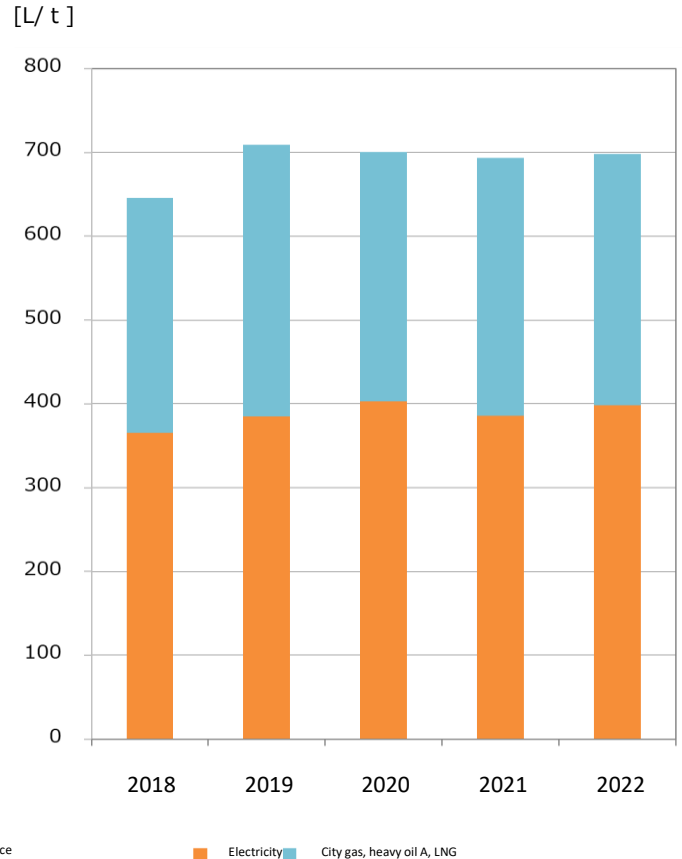
Business

# Prevention of global warming and rationalisation of energy use

## Greenhouse gas (CO<sub>2</sub>) emissions



## Changes in energy intensity



Greenhouse gas (CO<sub>2</sub>) emissions in FY2022 were 5% higher than in the previous year. (due to increased production and higher CO<sub>2</sub> emission factors for electricity)

- At the Nagoya plant, efforts were made to level the input load with the aim of increasing biogas recovery from wastewater treatment, and to reduce the energy used to heat the treatment tanks by making effective use of high-temperature wastewater. (Biogas recovery increased by 17% year-on-year).
- At the Yoro Plant, air pipes were shared (394 t CO<sub>2</sub> reduction) and air conditioners were upgraded to high-efficiency units (8 t CO<sub>2</sub> reduction).
- At the Shiga plant, cooling towers were cleaned and steam traps were inspected simultaneously to improve leaks. Energy use increased by 44% following the operation of the blending plant.

Compared to last year, the CO emission factor for electricity has increased and is expected to increase in the future. We will continue to improve the efficiency of our facilities and reduce greenhouse gas (CO<sub>2</sub>) emissions.

The energy intensity in FY2022 decreased by 0.3% compared to the previous year.

- The following initiatives were implemented to improve energy intensity.
  - Improvement of productivity
  - Introduction of energy-saving facilities and equipment
  - Promotion of energy-saving activities through energy-saving proposals (381 proposals).

In order to continuously improve energy intensity in FY2022, we will continue to work on reducing energy intensity by improving the operation of existing facilities and actively introducing high-efficiency equipment and energy-creating equipment.

※What is Amano Enzyme's basic unit?

Specific unit = Crude oil equivalent of electricity or city gas, heavy oil A or LNG [L] / volume of oil to be prepared [t].

The value is calculated as follows.



## Energy conservation initiatives

- The Nagoya plant is working to improve the operation of biogas recovery through anaerobic treatment of wastewater (using biogas as fuel), which started in 2018, and has increased gas recovery: in FY2022, the plant achieved a 17% increase over the previous year and a 31% increase over FY18.
- At the Yoro plant, energy consumption is being reduced through the introduction of energy-saving equipment, such as the introduction of RO membranes to improve boiler efficiency and the recovery of waste heat from sludge dryers.
- At the Shiga Plant, continuous improvements are being made to the operation of existing equipment, such as the promotion of efficiency improvements through cooling tower cleaning, and plans for the introduction of energy-saving equipment for the coming year.
- All offices will actively introduce energy-saving equipment to achieve company-wide energy savings.



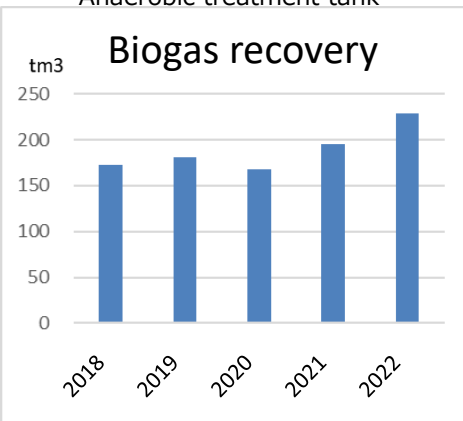
Wastewater treatment plant  
Anaerobic treatment tank



Biogas recovery tank



Waste heat recovery from sludge dryers



## Initiatives to reduce the environmental impact of hazardous

### ■ Prevention of ozone layer depletion by CFC gases.

The use of CFC gas, which causes ozone depletion and global warming, is reduced by introducing CFC or non-CFC equipment and equipment as required, for example by replacing cooling equipment that used CFC gas as a refrigerant with equipment that uses alternative CFC gas, and regular inspections are carried out to prevent leakages.



Air-conditioning systems  
using alternative CFCs



non-fluorocarbon  
ultra-low temperature  
freezer

### ■ Preventing mercury pollution of water and soil

LED lighting fixtures have been installed in line with activities to eliminate fluorescent and mercury lamps that use mercury, which is harmful to the human body. This eliminates the risk of mercury pollution of water and soil and saves energy.



Cryogenic storage using  
alternative CFCs



## Pollution prevention initiatives

### ■ Prevention of air pollution

#### Liquefied natural gas (LNG) as boiler fuel

In January 2017, the Yoro Plant converted the fuel for its main boiler from heavy oil A to LNG, and the boiler was also upgraded to a high-efficiency type. This not only significantly reduces the amount of nitrogen oxide (NOX), a pollutant that causes photochemical smog and acid rain, by approximately 40%\* compared to coal, but also almost eliminates sulphur oxide (SOX) as the sulphur content in LNG is very small. This LNG is used as fuel for the main boiler at the Yoro Plant and contributes to the prevention of air pollution by increasing combustion efficiency with high-efficiency boilers.



※Sources: Ministry of the Environment,

"Order for Enforcement of the Act on Promotion of Global Warming Countermeasures"; IEA, "Natural Gas Prospects to 2010,1986".

### ■ Prevention of water pollution and odours

#### Proper operation of wastewater treatment plants

Each plant and innovation centre is equipped with wastewater treatment facilities to treat wastewater discharged from plants and other facilities. In addition to the 8th Total Volume Regulation and local government bylaws, the company also complies with its own voluntary water quality standards in an effort to prevent water pollution.

In addition, as a measure to prevent odour pollution to the neighbouring areas of the plant, the plant ensures that treatment processes appropriate for the wastewater of each production item are carried out, and also strives to prevent odour pollution by strengthening the sealing of the liquid waste storage tank to reduce odour leakage and by spraying deodorising agents to reduce odours.



wastewater treatment plant (Nagoya plant)

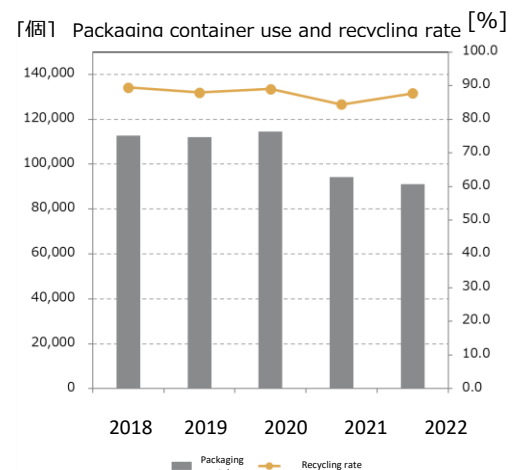
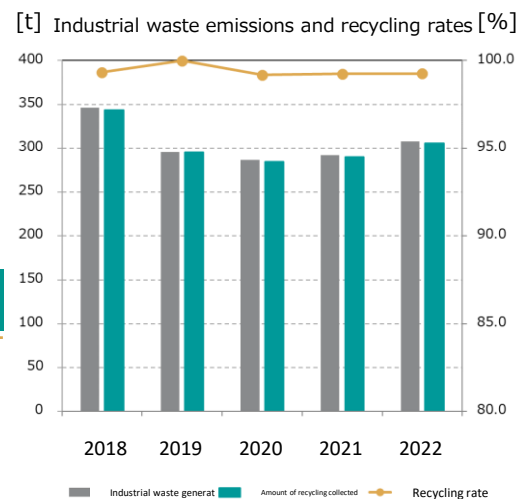
## Promoting industrial waste reduction and recycling

#### Industrial waste generation and recycling rate

Industrial waste emissions at all sites increased by approximately 5% compared to the previous year. As part of efforts to reduce industrial waste, the Nagoya Plant is switching to packaging containers that are easier to recycle. The Shiga Plant recycles used container containers instead of discarding them.

Combustible materials are supplied with heat outside the site through a residual heat utilisation facility at the municipal waste treatment plant, and the completely burnt incinerator ash is reused as a cement raw material.

Efforts will continue to be made to reduce the amount of industrial waste generated and maintain the recycling rate.

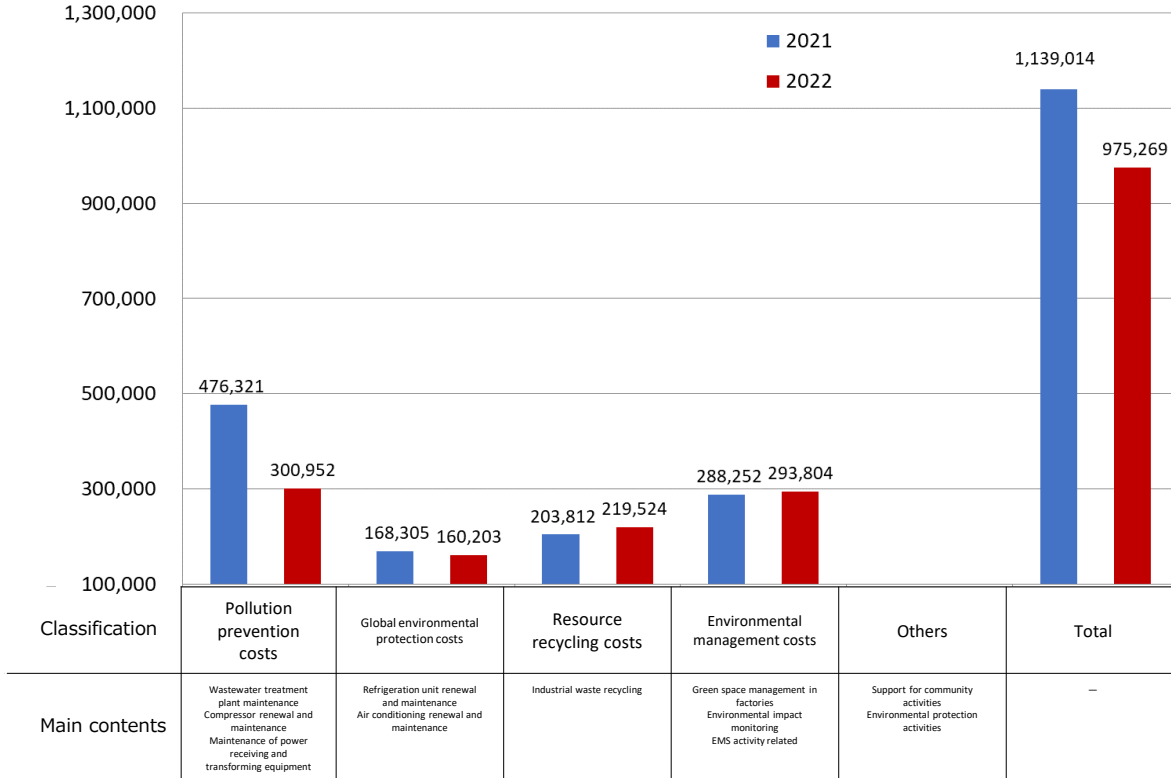


## 2022 Environmental accounting

In promoting environmental management, the following table shows the amount of investment in environmental measures and environmental protection costs for all sites in FY2022.

Amounts (in thousands of yen)

### Environmental accounting



## Social activities and community communication report

- Cooperation in the collection of paper resources such as old newspapers and unwanted books at resource collections at primary schools in neighbouring districts (Innovation Centre).
- Cooperation in the collection of used paper by the community development council in the neighbouring district (Yoro Plant).
- Regular monthly clean-up activities of roads, gutters, etc. in the vicinity of business sites as part of local environment beautification activities (all business sites).

