



EHS Report 2019

EHS: Environment, Health and Safety

Shionogi & Co., Ltd.

Editorial Policy

■ Periods

This EHS report covers the period of the fiscal year 2018 (from April 1, 2018 through March 31, 2019) in Japan and the calendar year 2018 (from January 1 through December 31, 2018) outside Japan with regard to the results achieved. The report also covers our activities conducted immediately before or after these periods.

■ Organizations

The report covers the EHS activities of Shionogi & Co., Ltd. and the Shionogi Group companies within Japan. Sections of the report that concern a different set of organizations are clearly indicated as such in each instance. There has been no change in the composition of the Shionogi Group companies since the previous year. With regard to the Nanjing Plant of C&O Pharmaceutical Technology (Holdings) Limited, a non-Japanese Shionogi Group company and manufacturing base, the relevant data are disclosed separately from those of the Shionogi Group under "Site Data."

Company	Operating sites	
Shionogi & Co., Ltd.	Head Office	Settsu Plant*2
	Tokyo Branch Office (Tokyo)	Kanegasaki Plant (Iwate Prefecture)*2
	Human Health Care Division (including its sales offices across Japan)	Shionogi Pharmaceutical Research Center (SPRC)
	Kuise Site (Hyogo Prefecture)	Aburahi Facilities (Shiga Prefecture)
Group Companies	Shionogi Pharma Chemicals Co., Ltd. (Tokushima Prefecture)*2	
	Shionogi Analysis Center Co., Ltd.*1/*2	
	Saishin Igaku Co., Ltd.	
	Shionogi Techno Advance Research Co., Ltd.*1	
	Shionogi Administration Service Co., Ltd.	
	Shionogi Business Partner Co., Ltd.	
	Shionogi Marketing Solutions Co., Ltd.*1	
	Shionogi Career Development Center Co., Ltd.*1	
	Shionogi Digital Science Co., Ltd.	
	Shionogi Pharmacovigilance Center Co., Ltd.*1	
	Aburahi AgroResearch Co., Ltd.*1 (Shiga Prefecture)	
	Shionogi Smile Heart Co., Ltd.*1	
	C&O Pharmaceutical Technology (Holdings) Limited (Nanjing Plant, China)	

*1 Located on the premises of Shionogi & Co., Ltd.; those with no indication of location are all situated in Osaka Prefecture.

*2 Commenced operation as Shionogi Pharma Co., Ltd., a wholly-owned subsidiary of Shionogi & Co., Ltd. in charge of manufacturing and related functions of the Shionogi Group, on April 1, 2019; Shionogi Pharma Chemicals Co., Ltd. and Shionogi Analysis Center Co., Ltd. were absorbed by and merged into Shionogi Pharma Co., Ltd.

■ Numerical data and graphs

The numerical data provided in the report are obtained by rounding off digits smaller than the units indicated. Accordingly, the actual sums of the individual figures in the graphs and charts do not necessarily correspond to the total figures in the same graphs and charts. The CO2 equivalent conversion of energy source is based on the numerical measures established in-house, except in the table on page 54, in which the coefficients indicated are used. The productivity figures are based on consolidated sales.

■ Reporting guidelines

The Environmental Reporting Guidelines of the Ministry of the Environment of Japan (edition 2018) are used as a reference.

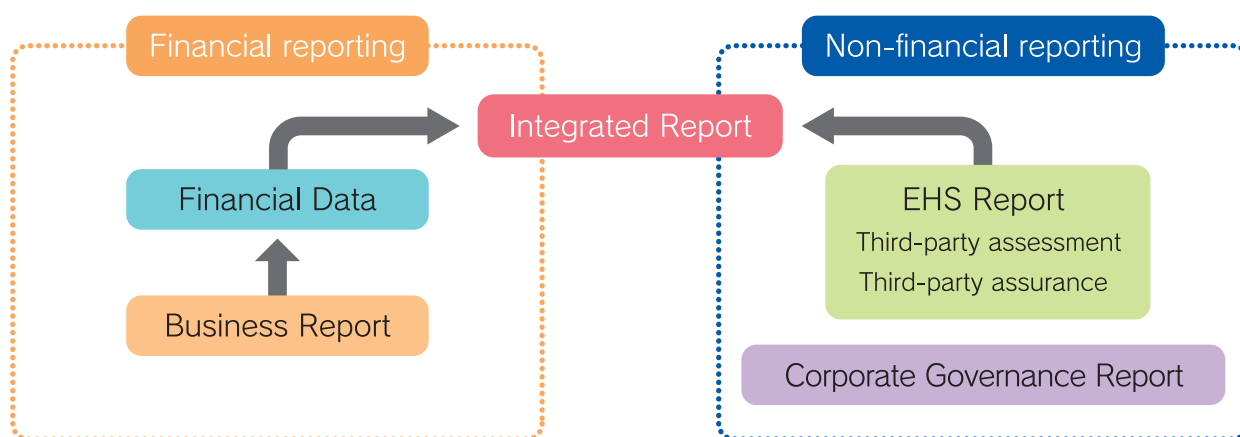
Overall reporting view

A copy of this EHS Report is made available on Shionogi's official website in order to publish detailed information. Excerpts from the same report are included in the Company's Integrated Report. To ensure the reliability and transparency of our publicly disclosed information and receive advice and feedback for future improvement, the EHS Report was subject to a third-party assessment by experts of the Institute for Environmental Management Accounting (IEMA).

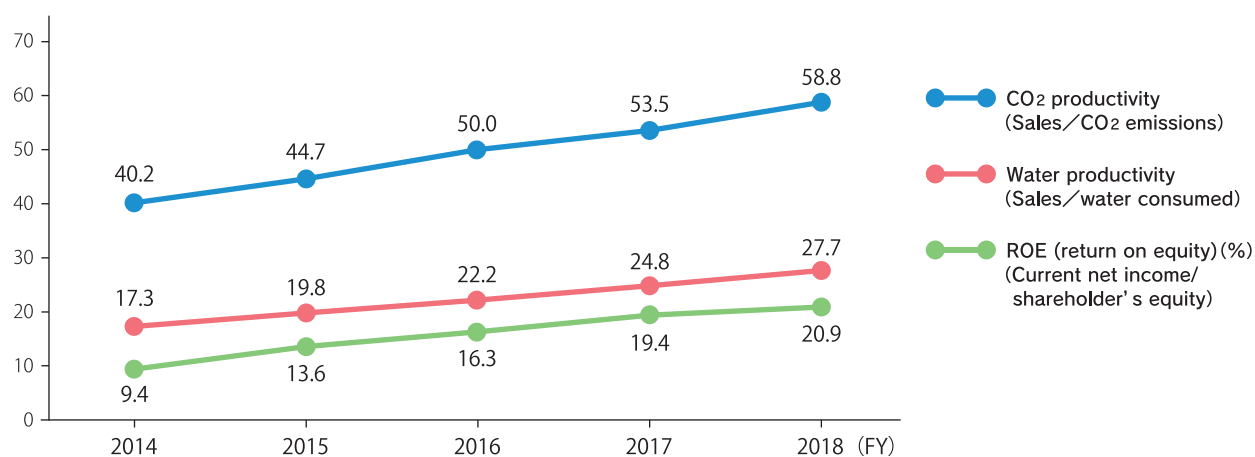
The EHS Report was also subject to third-party assurance by KPMG AZSA Sustainability Co., Ltd. in accordance with the standards of ISAE 3000 "Assurance Engagements Other Than Audits or Reviews of Historical Financial Information" and ISAE 3410 "Assurance Engagements on Greenhouse Gas Statements."

ISAE: International Standard on Assurance Engagements

The "J-SUS" symbol shown on the right certifies that this report has been assured by an assurance organization recognized by the Japanese Association of Assurance Organizations for Sustainability Information (J-SUS).



Trends of major performance assessment indicators



【Front cover photograph】

The photograph shows katsura trees (*Cercidiphyllum japonicum*; family: *cercidiphyllaceae*, genus: *cercidiphyllum*) in the botanical garden of the Aburahi Facilities. In autumn, with their leaves turning yellow, Katsura trees exude a caramel-like fragrance. (Photographed August 2019)



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EHS Policy and Shionogi's Approach to the Value Chain

■ Shionogi Group EHS Policy

In support of Shionogi's mission to supply the best possible medicine to protect the health and well-being of the patients we serve, Shionogi strives to conduct business activities in a manner that gives consideration to protection of the global environment, prevention of pollution, and support of the health and safety of our employees and the local communities in which Shionogi Group companies operate. Specifically, Shionogi is committed to:

1. Confirming the organization's commitment to building a high-quality EHS management system.
2. Complying with all relevant laws and regulations related to environmental health and safety and strive to maintain and improve the EHS level.
3. Striving to continuously reduce environmental impact and hazardous factors of Shionogi Group business activities, including impacts caused by research and development, production, distribution, and sale of Shionogi products.
4. Raising employees' awareness of EHS-related policies and topics through the prompt provision of information and regular training and practice.
5. Supporting the environmental protection and health and safety activities of the communities in which Shionogi Group companies are located, by acting in an environmentally-compatible way and by building a partnership of trust and accountability with the local community.

Established on October 5, 2015



Isao Teshirogi, Ph.D.
President and CEO
Shionogi & Co., Ltd.

■ Shionogi's Approach to the Value Chain

We are fully aware that, along with our actions as Shionogi, our collaborations with suppliers, our valued business partners, play a key role in ensuring that we fulfill our social responsibilities. Accordingly, in line with our purchasing policy, we require our suppliers to endorse the Pharmaceutical Industry Principles for Responsible Supply Chain Management ("the Principles"), a set of action principles established by the Pharmaceutical Supply Chain Initiative (PSCI). (See p. 20 for related information.)

PSCI Principles

【Ethics】

1. Business integrity and fair competition
2. Identification of concerns
3. Animal welfare
4. Privacy

【Labor】

1. Freely chosen employment
2. Child labor and young workers
3. Non-discrimination
4. Fair treatment
5. Wages, benefits and working hours
6. Freedom of association

【Environment】

1. Environmental authorizations
2. Waste and emissions
3. Spills and releases

【Management Systems】

1. Commitment and accountability
2. Legal and customer requirements
3. Risk management
4. Documentation
5. Training and competency
6. Continued improvement

【Health and Safety】

1. Worker protection
2. Process safety
3. Emergency preparedness and response
4. Hazard information

(Items of the Principles only)



Message from the EHS Corporate Officer



Yoshiaki Kamoya

Corporate Officer in
Charge of EHS Affairs
Senior Executive Officer

■ Commitment by the EHS Corporate Officer

—Tackling social challenges and enhancing corporate value—

In 2015, the United Nations adopted the Sustainable Development Goals (SDGs) as goals that should be achieved by 2030 on a worldwide scale in terms of poverty and hunger, health, energy, climate change, peace in society, and so forth. Along the same line of thought, in Japan, where Shionogi is headquartered, the importance of measures to address the declining birth rate and populating aging, reinforced actions to combat climate change, and expansion of ESG investment*1 are being increasingly recognized. In this situation, we at Shionogi have renewed our commitment to activities to find solutions to social challenges so that we may continue to grow hand in hand with society as a drug-discovery-based pharmaceutical company, enjoying trust and expectations in all areas of our activities including EHS affairs from many stakeholders, for many years to come.

In Shionogi's Medium-Term Business Plan, "Shionogi Growth Strategy 2020" (SGS2020), our ongoing growth strategy for the year 2020, we uphold our goals of tackling social challenges and enhancing corporate value. We are aware that, in order to actively contribute to society in the economic, social and environmental realms through our innovative drug discovery, environmental protection and employees' health and safety, which are mentioned in the SDGs, are not merely corporate social responsibilities but are the most important prerequisites for our corporate existence. Accordingly, we carefully measure and assess our EHS-related risks and environmental impact, operating in conformity with the Shionogi Group EHS Action Targets. We thus vigorously pursue EHS activities in all our corporate activities not only within the Shionogi Group but throughout its supply chain.

Our vision is to be and remain a business group that actively contributes to realizing a sustainable society by serving all of its stakeholders with corporate and social value. With the ESG Action Plan in place to further promote our ESG activities, we are focusing our efforts on the following global challenges, involving the entire supply chain in corporate activities relating to the environment.

AMR*2

Reduction of environmental impact resulting from the production of antimicrobials



Climate change

Risk assessment and implementation of measures for CO₂ emission, water, etc. in connection with climate change



Circulatory economy and society

Reuse and recycling of resources and waste reduction (water, plastic)



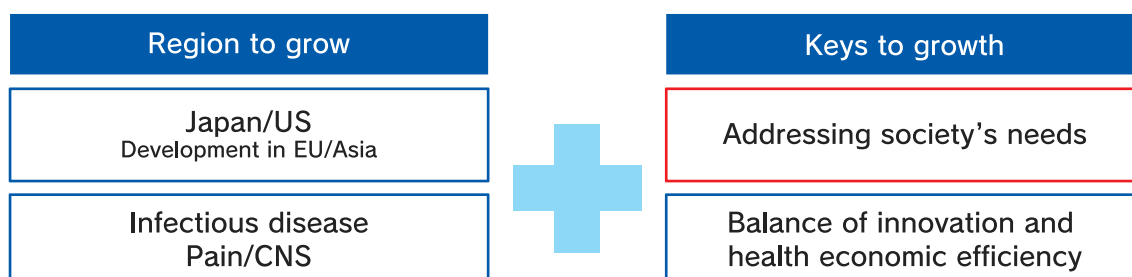
To widely inform Shionogi's stakeholders of its EHS efforts and gain their understanding, we regularly disclose relevant information, starting with the publication of the EHS Report in FY 2017. Further reinforcing our engagement with our stakeholders in this manner and through our efforts as described above, we continually strive to enhance our corporate value in a sustainable manner.

* 1 ESG investment: Investment in shares on the basis of companies' performance in terms of environmental, social, and governance aspects

* 2 AMR: antimicrobial resistance.

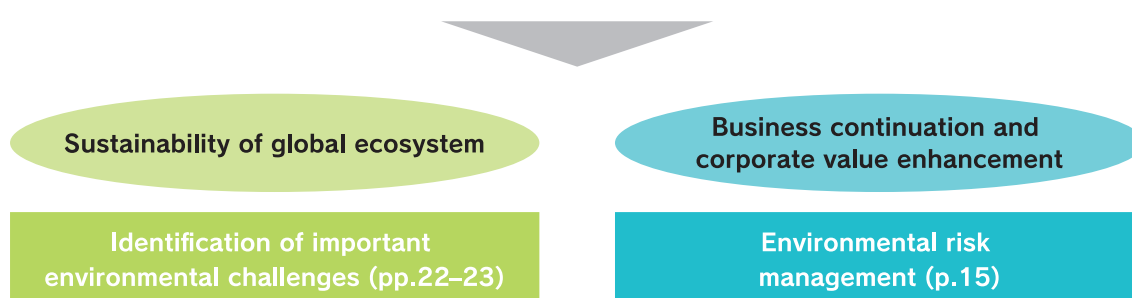
Medium-Term Business Plan “Shionogi Growth Strategy 2020” (SGS2020)

**Grow sustainably as a drug discovery-based pharmaceutical company
contributing to a more vigorous society through improved healthcare**



Shionogi Group's Important Challenges (Integrated Report)

Effort to create new value for customers and society
Mechanism supporting the realization of a sustainable society and Shionogi's growth



Shionogi Group EHS Action Targets (pp.24-27)

- Promote energy conservation and global warming control measures.
- Strengthen resource conservation and waste treatment/disposal measures.
- Manage chemical substances appropriately.
- Develop EHS management systems.
- Ensure a sound aquatic environment.
- Contribute to biodiversity preservation.
- Work toward zero occupational accidents resulting in lost work time.
- Introduce EHS initiatives to the supply chain.
- Promote health and productivity management.



Strategies for the reuse and recycling of plastic waste

At the G20 Summit held in Osaka in June 2019, the governments agreed on the reduction of additional plastic inflow to the ocean to zero by the year 2050, against the backdrop of the growing urgency of the problem of marine plastic waste. At Shionogi, we have been actively implementing measures to reduce negative environmental impact related to the products we sell. With regard to containers and packaging materials, we have thus far adopted measures to reduce their actual volumes and to switch to materials made of more environmentally responsible components. Specifically, we have been promoting a switch to carbon-neutral biomass plastic and the use of reused plastic of assured quality, while giving due consideration to our product quality and stable supply.

■ 3R (Reduce, Reuse and Recycle) initiative concerning containers and packaging materials

By FY 2018, we completed the measures summarized in the table below.

For “Reduce,” the volume of plastic we used dropped by 2.2 tons in FY 2018.

Measures	Description	Products concerned
Reduce	Change of material of trays (from plastic to paper)	All drugs provided in ampoules, vials and tubes
	Change of thickness of eye drop containers (made thinner)	All eye drops
	Change of thickness of PTP packaging materials (made thinner)	Flomox tablets
	Discontinuation of use of plastic cushioning materials for bottles	Irbetan tablets, etc.
Reuse	Inscription of plastic container/packaging material identification marks	All products
Recycle	Adoption of mechanically recycled PET film	Intuniv tablets
Renewable	Biomass bottles	Cymbalta capsules, Irbetan tablets, Pirespa tablets

■ Biomass bottles

Shionogi uses biomass bottles (plant-derived polyethylene bottles) for Cymbalta capsules, Irbetan tablets and Pirespa tablets.

Biomass bottles are packaging containers made of polyethylene derived from materials left over in sugarcane processing. A switch from conventional petroleum-derived polyethylene bottles to biomass bottles reduces CO₂ emissions and conserves fossil fuel resources (6 tons-CO₂ reduced in FY 2018).

Since our biomass bottles are more than 90% made of sugarcane-derived polyethylene, they conform to the standards established by the Japan BioPlastics Association for biomass plastic identification labeling (the product container bears the label shown in the photo).



Biomass plastic identification labeling

Biomass plastic products are those that contain organic (such as plant-derived) materials in excess of a specified percentage as their plastic component. The Japan BioPlastics Association certifies products that meet the criteria and permits them to bear the mark.

■ Mechanically recycled PET film

Shionogi uses mechanically recycled PET (polyethylene terephthalate) film in the packaging (aluminum bags) of Intuniv tablets (production commenced in FY 2019). Mechanically recycled PET film is taken from used PET bottles, which are broken into pieces, cleansed, and subjected to high-temperature decompression treatment. The replacement of virgin PET film in the outermost layer of the aluminum bags with mechanically recycled PET film results in reduced CO₂ emissions and fossil fuel conservation, while maintaining the quality of the packaged products.



Combating AMR (Antimicrobial Resistance)

AMR stands for “antimicrobial resistance,” that is, resistance to antimicrobials (antibiotics and synthetic antimicrobials). While AMR is believed to be principally caused by inappropriate or excessive administration of antimicrobials, release from manufacturing plants is also considered another factor in the emergence of bacteria resistant to antimicrobials. Therefore, it is essential to devise countermeasures from various aspects to control AMR. Having been engaged in the development, manufacture and sale of antimicrobials for many years, Shionogi has always strictly controlled the release of antimicrobials into the environment.



In September 2016, Shionogi signed the “AMR Industry Roadmap” with 13 global pharmaceutical companies and organizations at the World Economic Forum in Davos, to take the lead in combatting AMR. The signatory companies and organizations commit themselves to the strict management of antimicrobial release by themselves and throughout their supply chains, specifying their release management techniques in the form of a roadmap to be offered to all antimicrobial manufacturers so that they will also join in this worldwide effort to combat AMR. This movement has now developed into a major campaign called the “AMR Industry Alliance” involving an increasing number of companies handling antimicrobials.

< Davos Declaration on Antimicrobial Resistance >

<https://www.ifpma.org/wp-content/uploads/2016/09/Roadmap-for-Progress-on-AMR-FINAL.pdf>

< AMR Industry Alliance >

<https://www.amrindustryalliance.org/>

As part of AMR Industry Alliance activities, Shionogi regularly inspects its antimicrobial release control and management. We have already completed the inspection of all of our antimicrobial-manufacturing plants, as well as all of our suppliers in Japan, in compliance with the guidelines for antimicrobial release control published by the AMR Industry Alliance *¹ (Tables 1 and 2).

As part of Shionogi’s antimicrobial release control and management at its antimicrobial-manufacturing plants, waste water is released into in-house treatment facilities after antimicrobials contained in the waste water are deactivated. Laboratory tests have confirmed the efficacy of this process in rendering waste water harmless when released into the natural environment. In preparation for the present EHS report, the concentration of antimicrobials in actual waste water from Shionogi’s plants was once again analyzed in compliance with the AMR Industry Alliance guidelines. We have confirmed that waste water from three out of the five antimicrobial products manufactured at the Kanegasaki Plant, Shionogi’s principal manufacturing establishment, conform to the criteria for harmless antimicrobial release into the environment.*² Regarding the two other products, we are continuing the monitoring and analysis of their antimicrobial concentrations. As for solid waste materials generated in the process of antimicrobial manufacturing at the Kanegasaki Plant, they are entirely entrusted to an external service provider (Ecosystem Akita) for disposal by incineration. We have confirmed that there is no antimicrobial release into the environment via solid waste materials.

We have also confirmed that three of the four antimicrobials whose manufacturing is commissioned to suppliers in Japan conform to the criteria for harmless release into the environment. We are continuing surveillance and taking necessary remedial measures with regard to products whose conformity with the criteria has not been confirmed. In the near future, we intend to audit the status of conformity to the criteria on the part of our overseas suppliers related to antimicrobial manufacturing.

- *1 <Guidelines for antimicrobial release control published by the AMR Industry Alliance>
https://www.amrindustryalliance.org/wp-content/uploads/2018/02/AMR_Industry_Alliance_Manufacturing_Framework.pdf
- *2 As criteria for harmless antimicrobial release into the environment, Shionogi adopts "Predicted No-Effect Concentration" (PNEC) mentioned in the document*³ published by the AMR Industry Alliance or the basic value (0.01 µg/L) stated in the EMA Guidelines.
 EMA: European Medicines Agency
- *3 <https://setac.onlinelibrary.wiley.com/doi/pdf/10.1002/ieam.4141>

Table 1: Criteria for release into the environment for active pharmaceutical ingredients (API) of antimicrobials handled by Shionogi and audited items (those in yellow were audited in FY 2018)

API of antimicrobials handled by Shionogi	Criteria for release into the environment (µg/L)	Shionogi		Suppliers	
		Preparations	Drugs	Preparations	Drugs
Flomoxef	0.01	○	○	Company A	
Cefcapene pivoxil hydrochloride	0.01	○	○		
Latamoxef	0.01	○	○		
Doripenem	0.11	○	○	Company B	
Cefiderocol	0.01	○	○		
Sulfamethoxazole/trimethoprim	0.60/0.50			Company C	Company F/Company G
Metronidazole	0.13			Company D	Company H
Vancomycin hydrochloride	1.0			Company E	

Companies E-H: Overseas suppliers (to be audited)

Table 2: Supplier auditing results (FY 2018)

Supplier	Management system	Waste water management	Solid waste material management	Conformity to criteria for release
Company A	○	○	○	○
Company B	○	○	○	○
Company C	○	○	○	○
Company D	△	○	○	△

○:Conforming to the AMR Industry Alliance guidelines

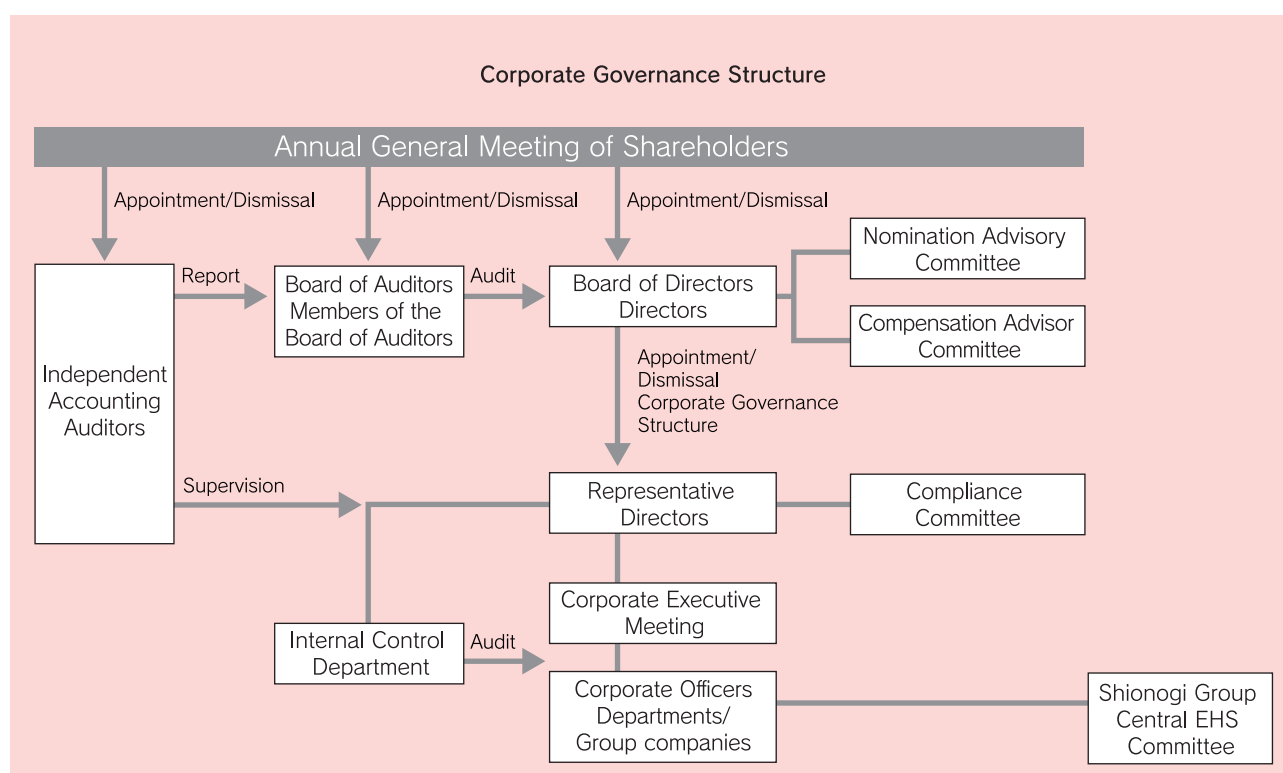
△:Not fully conforming to the AMR Industry Alliance guidelines; remedial measures being implemented

1. Governance

■ Corporate Governance Structure

The Shionogi Group has developed a corporate governance system to act out its Company Policy, the Group's corporate management philosophy, on a global scale. The Group defines corporate governance as a structure for transparent, fair, timely and resolute decision-making that takes into full consideration the needs, conditions and perspectives of shareholders, customers, employees, local communities and other stakeholders. Based on this definition, the Board of Directors has formulated the Group's Basic Views and Guidelines on Corporate Governance so as to realize the best possible corporate governance.

With regard to sustainability, the Shionogi Group pursues its activities, striving as a pharmaceutical company to tackle social challenges through innovative drug discovery and to fulfil its corporate social responsibilities in the economic, social, environmental and other domains. Such activities of the Shionogi Group, essential for sustainable development on a planetary scale, perfectly resonate with major global frameworks of actions and values as represented by the Sustainable Development Goals (SDGs) of the United Nations. The Board of Directors regularly receives activity reports and advises on further promotion.

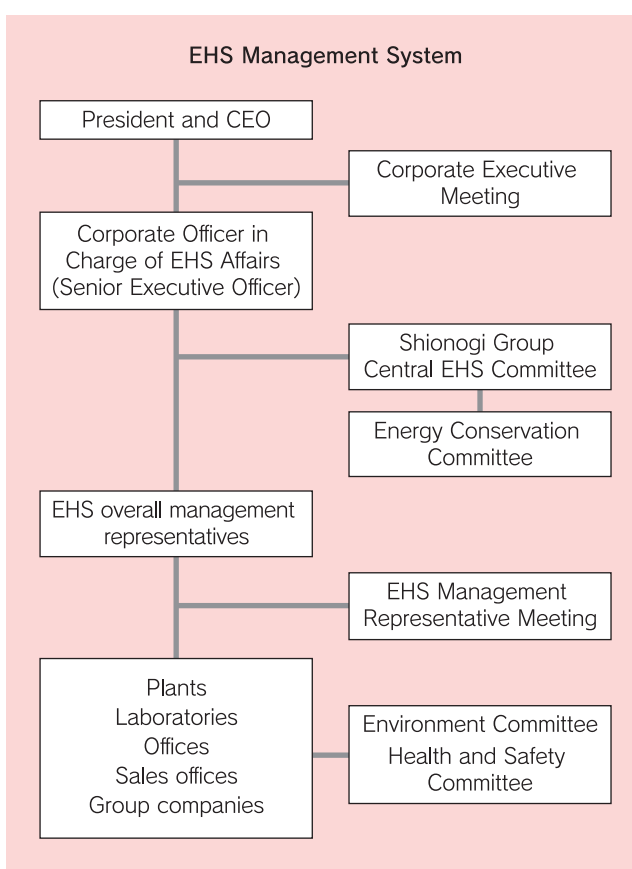


Shionogi's basic views and guidelines on corporate governance are viewable on the website:
<http://www.shionogi.co.jp/company/cg/basic.html>

■ EHS Management System

The Shionogi Group appoints a Senior Executive Officer as Corporate Officer in Charge of EHS Affairs to supervise overall EHS management. The Corporate Officer in Charge of EHS Affairs heads the Shionogi Group Central EHS Committee comprising representatives of Shionogi's respective divisions and the Group company presidents, who are responsible for EHS affairs at the respective companies. The Central EHS Committee sets goals, measures the status of their achievement, identifies future challenges, and conducts risk assessment and other reviews, thereby promoting EHS activities. A system is in place that allows EHS initiatives by the Shionogi Group as a whole to be reported to the Board of Directors via the Corporate Executive Meeting.

With regard to measures for energy conservation and global warming control, the Energy Conservation Committee, chaired by the Corporate Officer in Charge of EHS Affairs and placed under the Central EHS Committee, assumes duties such as setting medium-and long-term goals, managing progress, and assessing the status of legal and regulatory compliance.



■ Management Systems

The Shionogi Group uses management systems established in-house in conformity with ISO14001.

The Shionogi Group's EHS activities, including risk management, are reviewed as a whole each year by the Central EHS Committee to verify their efficacy and suitability. Matters of importance are reported to the Board of Directors via the Corporate Executive Meeting.

■ Audits

Shionogi conducts the following audits.

Audit	Description
External audits	Conducted by external accreditation organizations to verify that Shionogi's ISO 14001- and OHSAS 18001-certified management systems are operated in conformity with the standards
Internal audits	In-house self-inspection required under ISO 14001 and OHSAS 18001 conducted to confirm system suitability and status of conformity
EHS audits	Conducted by the EHS Office, which supervises the Shionogi Group's EHS initiatives, as directed by the management team; conducted separately from internal audits, to check whether EHS activities at Shionogi's operating sites and Group companies are appropriately implemented and maintained in compliance with the management systems, while pursuing continuous improvement
EHS audits of suppliers	Audits of Shionogi's suppliers of raw materials and intermediates; conducted by EHS Office personnel in compliance with the PSCI Principles

■ Emergency Preparedness

Shionogi's response to emergencies, including earthquakes, pandemics and corporate scandals, is based on its risk management policy, which places utmost importance on respect for human lives, consideration for and contribution to local communities, and business continuity. The risk management policy is also the basis of Shionogi's emergency response guidelines and manuals.

In preparation for earthquakes, fires, the leakage of toxic substances, and other eventualities, we have established response procedures and communication and reporting systems. We also carry out periodic training programs and review the response procedures from time to time. In FY 2018, a disaster mitigation drill was conducted at the respective operating sites, following a simulated scenario of an earthquake-triggered fire or tsunami.

On the occasion of the earthquake that occurred in northern Osaka Prefecture in June 2018, a seismic intensity of 5 was registered at the Settsu Plant, where the outer walls were damaged, some pipes ruptured, production facilities displaced, and materials fell down in the warehouse. Fortunately, there were no human injuries. The plant suspended production completely to fully focus on repair and recovery. On the 21st day, the plant was able to resume its operation step by step, starting with priority items.

Since the facilities and equipment at the Settsu Plant were protected with anti-seismic devices and measures, damage due to falling and collapsed objects was kept to a minimum. With regard to product supply, the plant was able to avoid stock-out as a result of careful implementation of recovery measures, including the resumption of manufacturing based on the order of priority based on the inventory status at that time. The procurement of raw materials was unhindered since no suppliers were seriously affected by the earthquake.

Other measures for emergency preparedness include basic life-saving workshops held at respective operating sites. Its personnel having undergone necessary training, the Settsu Plant is registered as a community life-saving support station and is also marked on Osaka Prefecture's AED (automated external defibrillator) location map. The Aburahi Facilities have also continued registration on the AED location map.



Basic life-saving workshop (Kanegasaki Plant)



Evacuation drill (Settsu Plant)

■ Education

Shionogi recognizes the importance of employees' being fully aware of the challenges of EHS initiatives in connection with their respective operations and actively pursuing them. Accordingly, the employees are provided with training programs on environment-related subjects, as well as preliminary education relating to operations with high environmental impacts, such as the management of waste materials and the handling of chemical substances. At each operating site, personnel are clearly informed of the target and actual figures of CO₂ emissions and the quantities of generated waste materials to encourage vigorous employee involvement. Education on health and safety is also carried out at each site in accordance with the risks it faces.

2. Stakeholder Engagement

To be and remain a business group that is needed and cherished by society, Shionogi attaches the utmost importance to maintaining an optimally balanced relationship with each of its stakeholders, as well as to improving its management transparency at all times as one of its essential responsibilities. Accordingly, we continue to provide all our stakeholders with information on our activities in a fair and timely manner, while striving to find solutions to social problems and improve our corporate value through dialogues with the stakeholders.

Shionogi's main EHS-related stakeholders include governmental agencies, trade organizations, and local communities. With regard to trade organizations, Shionogi sits on the environmental committee of the Federation of Pharmaceutical Manufacturers' Associations (FPMAJ), contributing to the formulation of industry-wide guidelines and activity plans. It goes without saying that Shionogi continuously and actively works toward the achievement of industry-wide goals thus established concerning global warming control, waste reduction, and so forth, in collaboration with all concerned parties. In addition to trade organizations, Shionogi also promotes partnership with various organizations in EHS-related areas.

Examples of stakeholder engagement mainly relating to EHS (FY 2018 results)

Target	Important challenges/objectives	Means of engagement	Frequency (and other particulars)
Patients, healthcare professionals	Supply of quality products with superior efficacy and safety	Information provision and collection by medical representatives	Any time
Employees	Safe and pleasant workplace Health maintenance and enhancement	Health and Safety Committee EHS education	About once per month at high-risk manufacturing and research facilities
Shareholders, investors	Corporate value, higher ESG assessment results	Interviews with investors IR meetings Investors conferences	Interviews about ESG assessment individually with three institutional investors and two consulting firms
Local communities	Participation in local community life Environmental protection	Periodic consultation Clean-up campaigns Plant tours	1–3 times per year (depending on operating sites)
Suppliers	Stable supply	EHS audits	24 companies
NGO/NPO	AMR CSR purchasing	AMR Industry Alliance PSCI	Once per month 3 times per year
Governmental agencies	Legal and regulatory compliance	Notification Reception of on-site inspections Response to surveys	Any time
Trade organizations	Planning of industry-wide strategies and policy measures	Participation in organizations' activities (IFPMA, FPMAJ, JPMA) * Response to surveys	Once per month

* IFPMA: International Federation of Pharmaceutical Manufacturers & Associations
 FPMAJ: Federation of Pharmaceutical Manufacturers' Associations
 JPMA: Japan Pharmaceutical Manufacturers Association

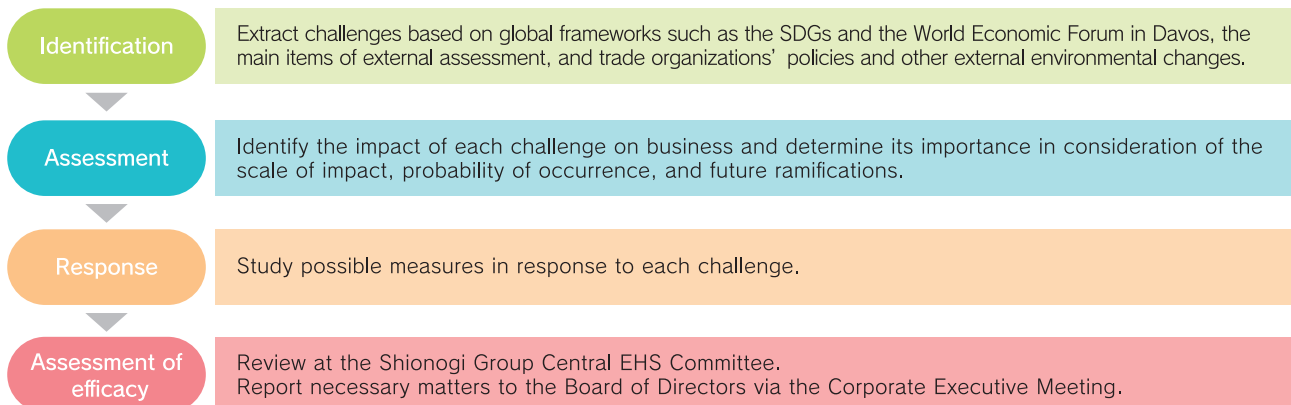
3. Risk Management

Myriad risks are involved in corporate life. It is imperative for corporations to prevent risks from developing into incidents and, in the case of an incident, to handle it in such a manner as to minimize damage.

At Shionogi, we approach risk management mainly from two perspectives to optimally manage all types of risks, internal and external, prevention and recurrence prevention in the event of an unexpected incident, thereby ensuring business continuity and corporate value enhancement.

The following is a summary of results from risk identification and assessment in connection with Shionogi's recent environment-related challenges.

Environmental risk management process



Identification, assessment results, and responses

Challenge	Risks and opportunities(including those for suppliers)	Impact	Probability	Future	Importance	Measures
AMR	Emergence of antimicrobial resistance	Large	Large	Large	○	<ul style="list-style-type: none"> - Pollution control during production at Shionogi and suppliers - Publication of AMR actions and measures
	Lowered reputation for the pharmaceutical industry	Large	Medium			
Climate change	Capital investment following regulatory reinforcement	Medium	Medium	Large	○	<ul style="list-style-type: none"> <Improve precision of climate change-related risk management> - Information gathering from governmental agencies and trade organizations - Formulation of CO₂ emission reduction plans by the Energy Conservation Committee - Formulation of measures for stable supply
	Discontinued operation due to extreme meteorological phenomena	Large	Small			
	Improved external assessment for reduced CO ₂ emissions	Medium	Small			
	Profit from change in the market for tropical infectious disease-related products	Medium	Small			
Water-related risks	Discontinued operation due to droughts	Large	Small	Large	○	<ul style="list-style-type: none"> <Improve precision of water-related risk management> - Information gathering from governmental agencies and trade organizations - Monitoring of waste water - Water consumption control
	Discontinued operation due to floods	Large	Small			
	Discontinued operation due to intake water quality deterioration	Large	Small			
	Capital investment following regulatory reinforcement concerning waste water criteria	Medium	Medium			
	Compromised public confidence due to pollution with waste water from operating sites	Large	Small			
Plastic	Increased plastic waste, lowered reputation due to plastic use for products	Large	Medium	Large	○	<ul style="list-style-type: none"> - Promotion of 3R initiatives - Restricted use for products
Chemical substances (legal revision) Biodiversity (industry-wide guidelines) Waste (industry-wide goals)	Compliance, reputation	—	—	—	○	<ul style="list-style-type: none"> - Adoption and promotion of EHS action goals

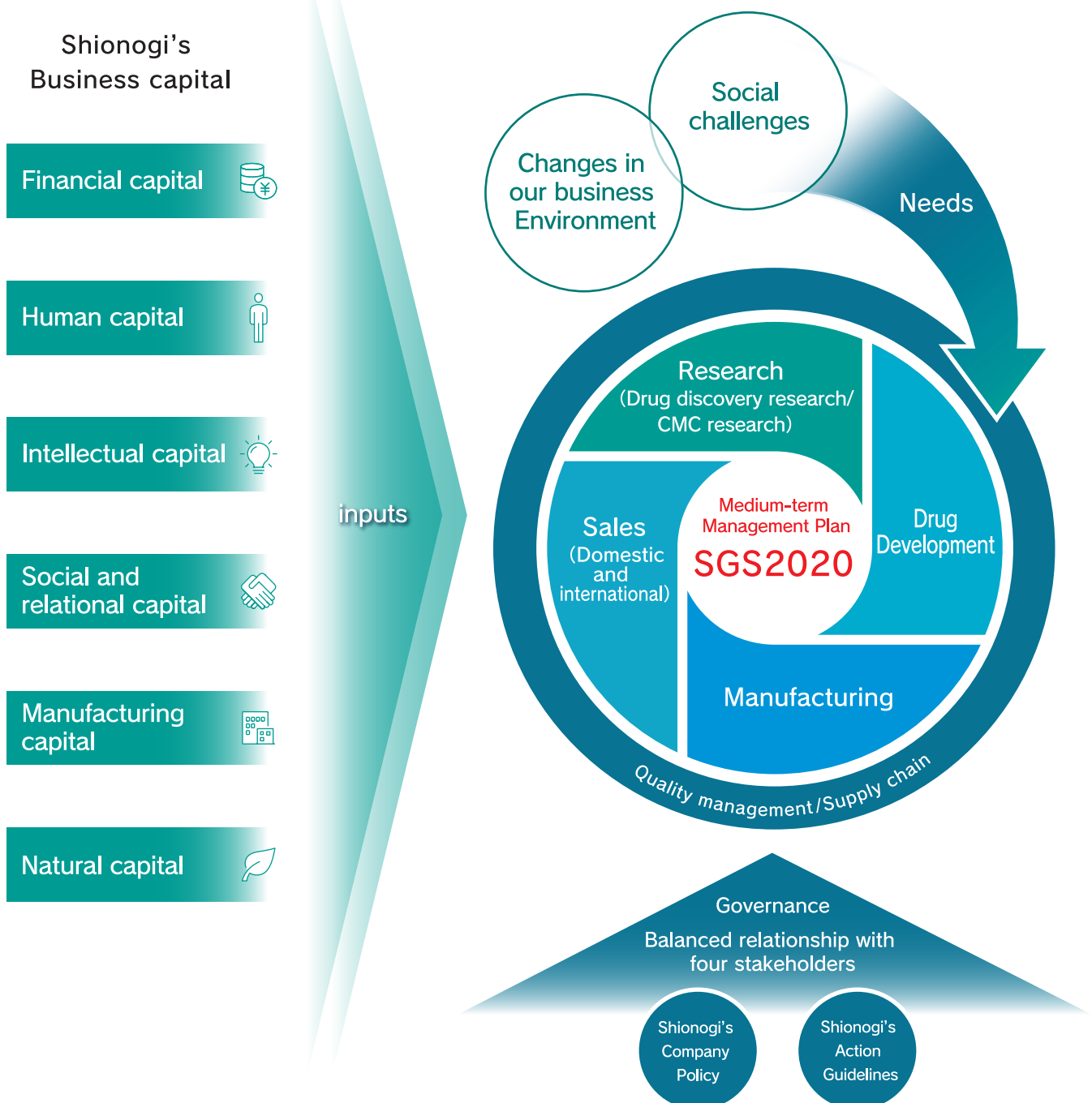
Basic assessment criteria are provided in the table below; deliberations by the Central EHS Committee are also included.

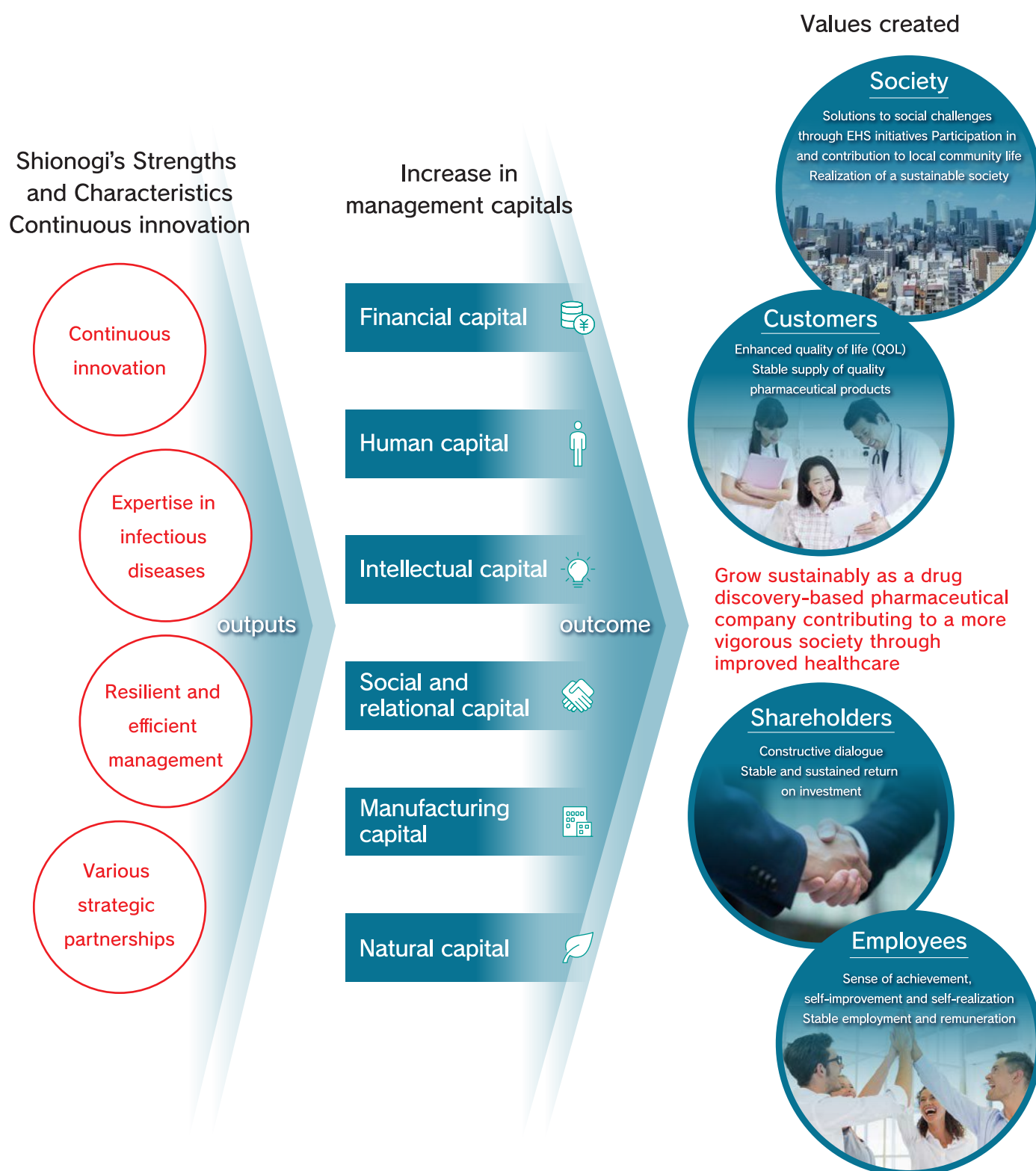
Level	Impact	Probability
Large	Discontinued operation	Frequent in the area/industry
Medium	Capital investment	Past incidents
Small	—	No past incidents

4. Business Model

Shionogi's business model is founded on its basic purpose to "create, manufacture, and sell." In specific terms, we engage in business activities by investing financial capital mainly coming from sales and utilizing manufacturing capital such as production centers, intellectual capital such as product pipeline and intellectual properties, human capital comprising diverse human resources possessing diverse abilities, social and relational capital comprising our stakeholders, and natural capital including energy, water, chemical compounds and other natural resources, thereby developing pharmaceutical products and providing various forms of value to society, customers, shareholders, employees and other stakeholders.

We strive to continue to be a company creating business innovations such as technological development, economic growth, and a society in which health, safety and security are fully assured, reinvesting benefits thus gained (business capital) in our business activities, thereby providing corporate and social value to all our stakeholders and contributing to the realization of a sustainable society.

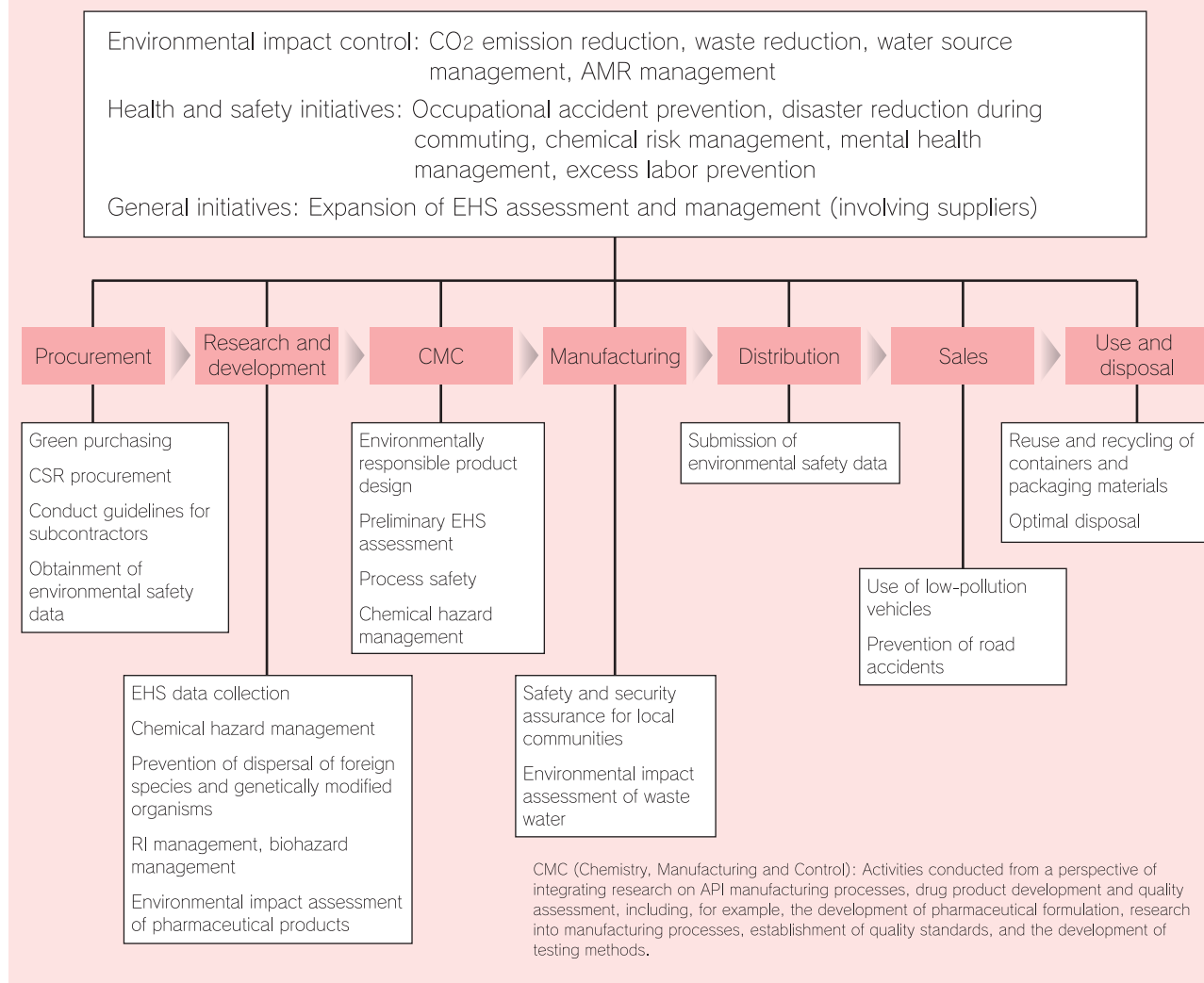




5. Value Chain Management

EHS is closely related to the whole spectrum of corporate life, ranging from raw material procurement to research, development, manufacturing, sales, use and disposal.

EHS Value Chain Map



■ Shionogi and the Environment (input and output from business activities)

At Shionogi, we strive to meet concrete targets that we set for CO₂ emissions, waste water, chemical substances, and waste resulting from our business activities, while ensuring that we have accurate data on energy consumption and waste generation.

Through efforts for pollution control and global environmental protection, and business activities that ensure the safety and health of all persons we work with and all local communities in which we operate, we aim to contribute to realizing a safety-assured workplace environment and an abundant society.

Energy		
Total energy	GJ	1,521,618
Electricity	MWh	81,471
Town gas	1,000 m ³	6,138
Propane gas (LPG)	tons	341
Liquefied natural gas (LNG)	tons	7,932
Heavy oil	kL	82
Kerosene	kL	1
Light oil	kL	3
Gasoline	kL	10
Gasoline (for sales vehicles)	kL	1,588

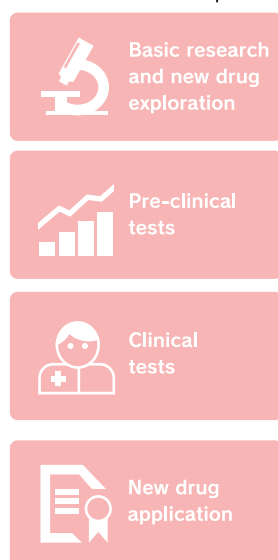
Water		
Tap water	1,000 m ³	254
Industrial water	1,000 m ³	1,061

Chemicals		
PRTR-designated chemicals (quantity handled)	tons	274

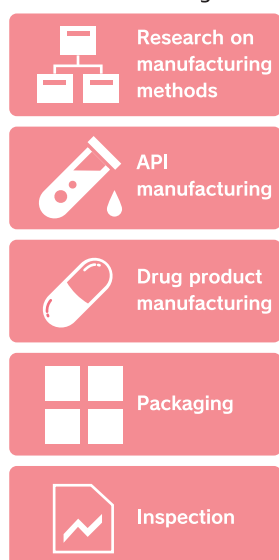
Containers and packaging materials		
Quantity used	tons	1,264

INPUT

Research and Development



Manufacturing



Administration and Sales



OUTPUT

Atmosphere		
CO ₂ (Scope 1 used as fuel)	tons-CO ₂	36,514
CO ₂ (Scope 1 used for sales vehicles)	tons-CO ₂	3,684
CO ₂ (Scope 2)	tons-CO ₂	25,352
NO _x	tons	17
SO _x	tons	0
Soot and dust	tons	2
PRTR-designated substances	tons	43
VOC	tons	46
Chlorofluorocarbons (CFCs)	tons-CO ₂	599

Water		
Sewers	1,000 m ³	310
Public waters	1,000 m ³	864
BOD	tons	5
COD	tons	2
PRTR-designated substances	tons	0
N	tons	6
P	tons	1

Waste materials		
discharged (amount generated including valuables)	tons	4,804
Generated	tons	3,824
Reused/recycled	tons	3,900
Sent to landfill	tons	38
PRTR-designated substances	tons	156

Containers and packaging materials		
Consigned for reuse/recycling	tons	177

■ Initiatives Covering the Supply Chain

At Shionogi, we are aware of the extreme importance of collaborating with our suppliers if Shionogi is to achieve continuous growth hand in hand with society as a drug-discovery-based pharmaceutical company. Therefore, in accordance with our procurement policy, we ask our suppliers to adopt Code of conduct for third party.

Code of conduct for third party refers to the Pharmaceutical Industry Principles for Responsible Supply Chain Management (“Principles”), proposed by PSCI,*¹ a non-profit organization comprising over 40 pharmaceutical companies around the globe and advocating CSR procurement*² in the pharmaceutical industry. The Principles cover a wide range of areas, including not only the environment, health and safety, but also ethics, workers’ rights, management systems concerning these values. Shionogi endorses and acts in accordance with all of the Principles.

At Shionogi’s manufacturing and research sites, we conduct environmental impact assessment regarding all aspects of their operations from the purchase of raw materials to disposal. Our awareness raising targets not only high-risk in-house operations but also outsourced services, waste disposal operators and other related parties. An emergency communication system is also established between Shionogi and its suppliers.

We perform EHS audits on suppliers of important active pharmaceutical ingredients (API), confirming the safety measures and environmental consideration in their manufacturing processes and other aspects. We have drawn up “Suppliers’ EHS/CSR Management Guidance,” which stipulates EHS risk categories and management procedures for suppliers, as well as auditing items to be implemented at each supplier management level (Table 1). For questionnaire surveys, we use PSCI’s Self-Assessment Questionnaire (SAQ) forms to check items such as ethics, labor, environment, and health and safety.

In FY 2018, we had the honor of having 24 suppliers respond to the Principles favorably, with whom we conducted written audits using questionnaire survey forms. With nine of them, the audits were conducted as on-site audits at their facilities. We intend to continue to enhance our supplier management through various means, including participation in auditor training programs organized by PSCI.

Table 1 Supplier Management Level and Auditing Items

No.	Category (by handled products)	Management level	Auditing items implemented		
			Written confirmation	Questionnaire survey	On-site audit
1	Suppliers of API, intermediates or preparations (GMP* ⁴ –conforming process) for drugs developed since the adoption of PV* ³ –based manufacturing	High	○	○	○
2	Irreplaceable suppliers Suppliers of API, intermediates or preparations (GMP-conforming process) for new products	Intermediate	○	○	
3	Suppliers other than the above (Manufacturers of general-use raw materials, subcontractors in charge of packaging, etc.)	Low	○		

<PSCI Principles (Code of conduct for third party)>

http://www.shionogi.co.jp/static/company/csr/psci_principles_201710.pdf



*1 PSCI: Pharmaceutical Supply Chain Initiative

*2 CSR procurement: Procurement whereby corporate customers require their suppliers to engage in similar CSR initiatives

*3 PV: Process validation; confirmation and documentation that the process is valid for permanently manufacturing products of the target quality when operated under a permissible range of conditions set based on the results of industrialization research, the past manufacturing records of similar products, or other such data and in consideration of variables likely to affect the preset product quality (physical properties of raw and other materials, operating conditions, etc.)

*4 GMP: Good Manufacturing Practice: international standards for the manufacturing and quality control of pharmaceutical products; the GMP-conforming manufacturing of pharmaceutical products is required to follow GMP procedures and guidelines concerning operations such as the delivery of raw materials, inspection, manufacturing, packaging, shipment management, storage, and collection and disposal.

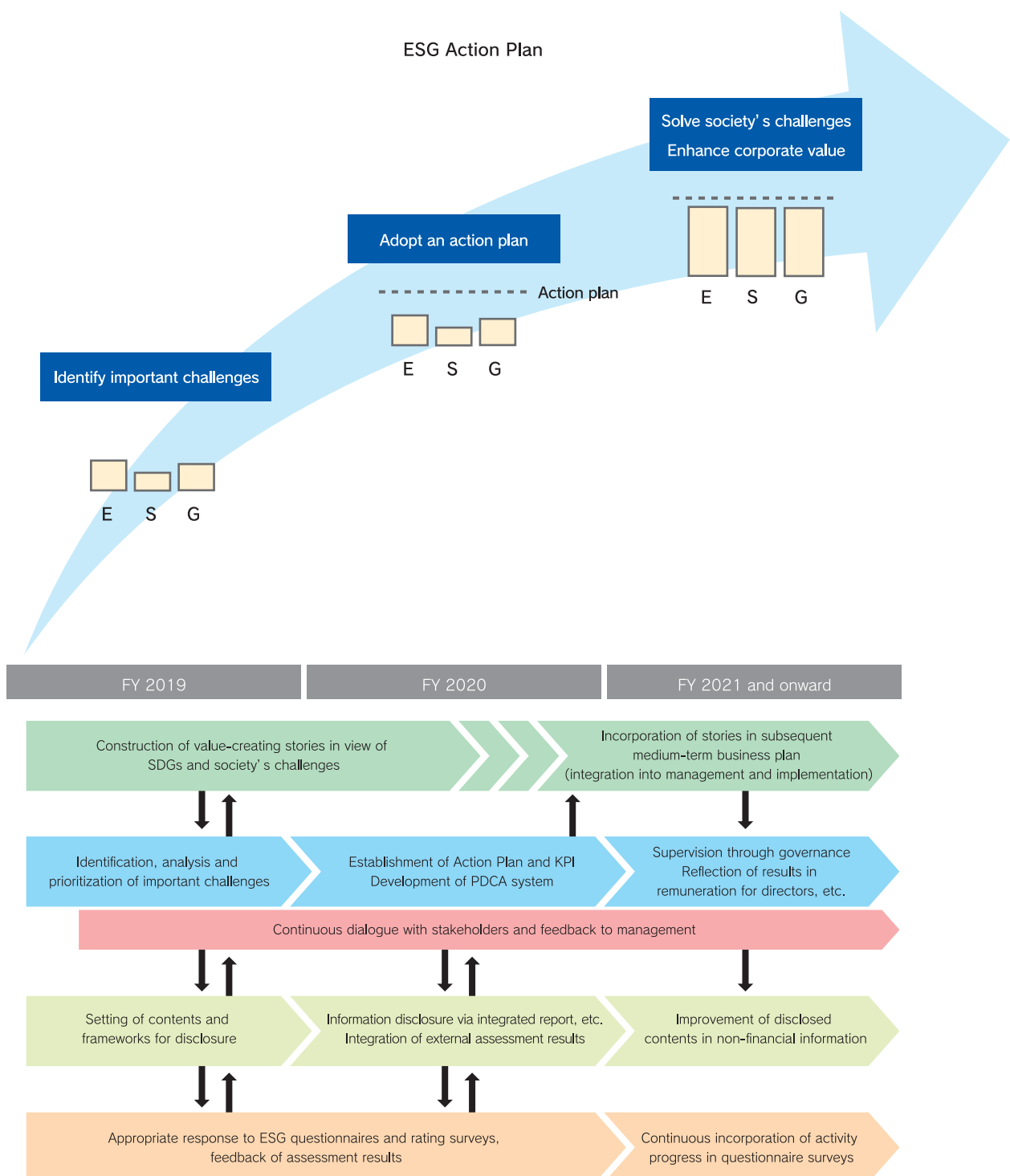
■ Green purchasing

Shionogi promotes green purchasing. Shionogi’s intranet-based purchasing system facilitates searches for, and identification of, environment-friendly products, with the indication of “green product marks” attributed to such items. This system encourages the purchase of environmentally responsible office supplies that conform to formally recognized standards, such as those of the Eco Mark and the Green Purchasing Network.

6. Long-Term Vision

In line with the vision of a drug-discovery-based pharmaceutical company growing hand in hand with society stated in Shionogi's Medium-Term Business Plan "SGS2020," we are determined to vigorously pursue activities to find solutions to society's problems so that we may remain a company that is needed and cherished by our stakeholders in many areas including EHS for many years to come.

To be able to continue to provide all stakeholders with benefits deriving from Shionogi's corporate value and social value, we uphold the vision of contributing to the realization of a sustainable society. Accordingly, we have established an ESG Action Plan to further promote our ESG activities.



7. Identification of Material Issues Related to the Environment

At Shionogi, we draw up a Materiality Map regarding our business activities in consideration of their relevance to our business and their importance in society.

Regarding the Shionogi Group's EHS activities, we extracted and identified material (important) issues in consideration of their impact on the sustainability of global ecosystems and their impact on the stakeholders.

In the process of identification, we extracted and assessed materiality in meetings among related divisions within the Company and through dialogues with ESG institutional investors, external experts, and other such stakeholders. The material issues thus identified were reported to the Corporate Executive Meeting and the Board of Directors upon approval by the Shionogi Group Central EHS Committee.

On the identified material issues, we received views from Prof. Katsuhiko Kokubu (Kobe University Graduate School of Business Administration; right photo) and Ms. Eriko Nashioka (certified public accountant and licensed tax accountant/ Representative Director of IEMA; left photo), from whom Shionogi received the EHS Management Assessment in the present EHS Report.



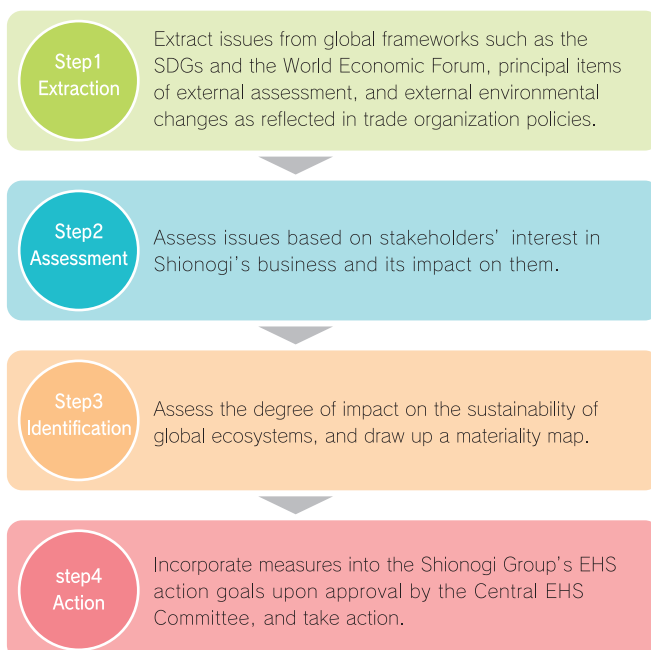
It is extremely important for a company to pursue its business activities upon the identification of material issues, so as to contribute to the realization of a sustainable society and continue and develop the business activities. So your identification of material issues following an appropriate process is highly positive.

All of the three themes that Shionogi has identified as highly important environment-related challenges, namely AMR, climate change and water risk, are indeed extremely important for Japan and the whole world. The choice of AMR, particularly relevant to Shionogi, is commendable.

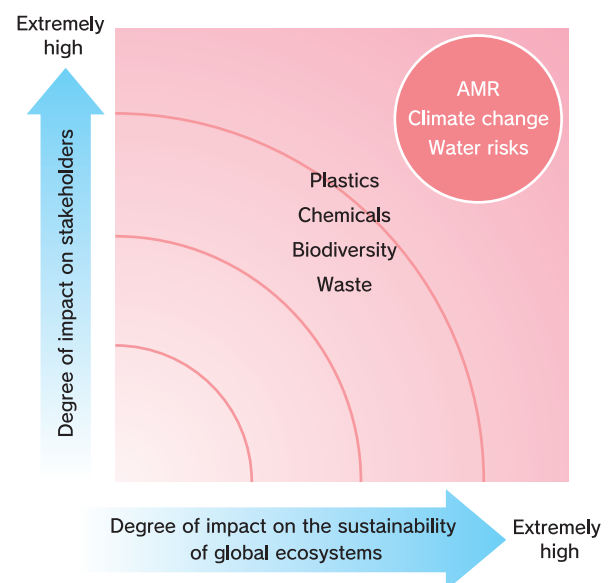
The identification of material issues is not merely related to drawing up priority policies; it takes on significance when it leads to concrete action. Therefore, it is essential to pursue activities in a continued manner toward solutions with regard to these issues. We strongly expect Shionogi to create value that contributes to society through its activities responding to material issues in the future.

Shionogi hopes to further deepen its activities by clarifying its concrete steps toward handling material issues in the future and key performance indicators (KPI), to offer value to society and meet our stakeholders' expectations.









Identification of material issues relating to EHS



Materiality Map



Summary of identification of material issues

Material issues		Summary of identification
AMR		This is a global issue that a pharmaceutical company manufacturing antimicrobials cannot ignore. The emergence of AMR impacts global ecosystems enormously.
Climate change	 	Shionogi's CO ₂ emissions are relatively small when all industrial sectors are taken into account. Nevertheless, stakeholders' demand for action in this regard is growing increasingly strong. Responding to climate change is essential for the sustainability of global ecosystems.
Water		Water is an indispensable factor for the business continuity of pharmaceutical companies and essential for the sustainability of global ecosystems.
Plastics	 	A part of the problem of marine plastic, this is an international issue, but Shionogi uses only a small quantity of plastics in containers and packaging materials for products.
Chemicals Biodiversity Waste	 	It is imperative to respond to industry-wide guidelines and targets and legal revisions.

Material issues and the value chain

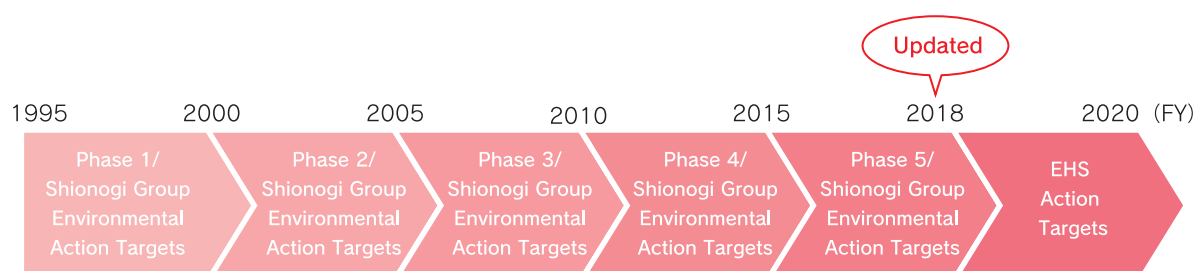
	Purchase	R&D	Manufacturing	Distribution and sales	Use and disposal
AMR	AMR management		AMR management		
Climate change (energy conservation, global warming control)	Climate change risk assessment	Energy conservation	Climate change risk assessment Energy conservation	Introduction of hybrid vehicles	
Water	Water risk assessment	Water risk assessment, water conservation, waste water management	Water risk assessment, water conservation, waste water management		
Plastics (resource conservation, waste material control)	Green purchasing	Design of environmentally responsible products	3R's of waste materials		Containers and packaging materials Reuse Responsible disposal
Management of chemical substances		Process safety Chemical hazards	Environmental impact assessment of pharmaceutical products		
Biodiversity		Prevention of dispersal of foreign species and genetically modified organisms			

8. EHS Action Targets

Since 1995, Shionogi has been working toward continuous improvement in terms of energy conservation, global warming control, resource conservation and waste management, reinforced management of chemical substance, and so forth, in all areas of our business activities, including R&D, production, and sales, following medium-term targets. In FY 2016, we commenced our effort toward the achievement of Phase 5 of the Shionogi Group Environmental Action Targets for the period from FY 2016 to FY 2020. In FY 2018, we upgraded them as the Shionogi Group EHS Action Targets (FY2018–2020), always working toward continuous improvement from the two aspects of the environment and health & safety. We intend to update our action plan each year based on identified risks, opportunities and important challenges.

The Action Targets also cover the areas of health management and labor accidents to ensure that we conduct business activities in consideration of the health and safety of the employees and the local communities where we operate based on the Shionogi Group EHS Policy.

Shionogi Group EHS Action Targets	FY 2018 Targets
1. Promote energy conservation and global warming control measures. <ul style="list-style-type: none"> Reduce CO₂ emissions in FY 2020 by 33% from the FY 2005 benchmark (by 40% in FY 2030). Improve specific energy efficiencies by an annual average of 1%. Promote the introduction of highly energy-efficient equipment. 	CO₂ emissions: reduced by 33% (64,293 tons-CO₂) Specific energy efficiencies: improved by 5.4% (from FY 2015) <ul style="list-style-type: none"> Switch to a high-efficiency air-conditioning (AC) system; discontinue air-conditioning periodically by adjusting output. (Settsu Plant) Switch to high-efficiency motors; renew refrigeration equipment; reduce energy consumption by reviewing the operational mode. (Kanegasaki Plant) Review air-conditioning at night and on holidays; renew heat pumps. (SPRC) Continue the discontinuation of hot water pump operation at night and of wastewater treatment station raw water pump operation. (Aburahi Facilities)
2. Strengthen resource conservation and waste treatment/disposal measures. <ul style="list-style-type: none"> Reduce the amount of waste generated by 55% from the FY 2000 benchmark. Improve the percentage of waste reused or recycled to 73% or higher, and reduce waste disposed of as landfill. 	Amount of waste generated: reduced by 35% (4,335 tons) Percentage of waste reused or recycled: 78% <ul style="list-style-type: none"> Maintain stable operation to reduce temporary waste (equipment stoppage, deviation, etc.); take an appropriate inventory of reagents to reduce the amount of expired reagents to be disposed of. (Settsu Plant) Recover usable materials from waste; reduce liquid waste. (Kanegasaki Plant) Promote the reuse of disused articles (research and general-use apparatuses, office supplies); increase the amount of valuable waste through thorough sorting. (SPRC)
3. Manage chemical substances appropriately. <ul style="list-style-type: none"> Appropriately treat and dispose of Poly Chlorinated Biphenyl (PCB)-containing waste materials at 78% of the sites and divisions handling them (toward a total ban in FY 2022). Appropriately manage Fluorocarbon-using equipment. Promote measures against chemical hazards. 	<ul style="list-style-type: none"> Appropriately treat PCB-containing waste according to schedule. Appropriately manage chemicals all the way to the completion of treatment/disposal.
	<ul style="list-style-type: none"> Appropriately manage Fluorocarbon-using equipment (inspection, record keeping, leakage data recording). Promote a plan for a total ban on Hydrochlorofluorocarbon (HCFC, R22)-using equipment.
	<ul style="list-style-type: none"> Examine guidelines concerning chemical hazards. Appropriately treat water used for washing equipment. (Settsu Plant) Conduct thorough management to contain antimicrobial agents. (Kanegasaki Plant) Establish a management system using safety datasheets (SDSs) for Shionogi products.
4. Develop EHS management system. <ul style="list-style-type: none"> Adjust to the revised version of ISO14001, and promote continuous improvement. Integrate the environmental, health, and safety management systems. 	<ul style="list-style-type: none"> Promote information sharing and understanding by holding EHS committee meetings and the like. Integrate environmental, health, and safety management systems to operate them more efficiently. (Settsu Plant) Promote improvement activities closely related to actual operations. (Kanegasaki Plant)



Scope of application: Group companies in Japan

FY 2018 Results	FY 2019 Targets
<p>CO₂ emissions: reduced by 35% <achieved> (61,866 tons-CO₂) Specific energy efficiencies: improved by 5.3% <not achieved> (from FY 2015)</p> <ul style="list-style-type: none"> Specific energy efficiencies deteriorated due to a decrease in the denominator (total floor area). Switch was made to a high-efficiency AC system; periodical discontinuation of air-conditioning began by adjusting output. (Settsu Plant) Switch was made to high-efficiency motors; refrigeration equipment was renewed; energy consumption was reduced by reviewing the operational mode. (Kanegasaki Plant) Air-conditioning at night and on holidays was reviewed; heat pumps were renewed. (SPRC) Discontinuation of hot water pump operation at night and of wastewater treatment station raw water pump operation was continued. (Aburahi Facilities) 	<p>CO₂ emissions: reduced by 36% (61,271 tons-CO₂) Specific energy efficiencies: improved by 0.3% (from FY 2015)</p> <ul style="list-style-type: none"> Specific energy efficiencies will deteriorate due to a decrease in the denominator (total floor area). Renew refrigeration equipment. (Kuisse Site) Renew pumps; discontinue air-conditioning periodically by adjusting output. (Settsu Plant) Review air-conditioning at night and on holidays; renew heat pumps; switch to LED lighting upon renewal. (SPRC)
<p>Amount of waste generated: reduced by 43% (3,824 tons) <achieved> Percentage of waste reused or recycled: 81% <achieved></p> <ul style="list-style-type: none"> The amount of waste was reduced by reviewing warehouse and production processes. (Settsu Plant) The amount of expired reagents to be disposed of was reduced (reagents were sorted out to recover valuable ones); used containers were put to reuse instead of disposal; recovery of valuable metals was promoted through sorting. (Kanegasaki Plant) Risk was reduced by signing contracts with several waste handling service providers; thorough reuse, sorting and recycling were conducted. (SPRC) 	<p>Amount of waste generated: reduced by 33% (4,500 tons) Percentage of waste reused or recycled: 80%</p> <ul style="list-style-type: none"> The amount of waste will increase due to an increase in production volume. Control plastic use for products. Maintain stable operation to reduce temporary waste (equipment stoppage, deviation, etc.); take an appropriate inventory of reagents to reduce the amount of expired reagents to be disposed of; promote sale of valuable waste. (Settsu Plant) Reduce liquid waste; recover valuable materials from waste; reduce waste plastic; promote recovery of valuables through sorting. (Kanegasaki Plant) Promote the reuse of disused articles (research and general-use apparatuses, office supplies); increase the amount of valuable waste through thorough sorting. (SPRC)
<ul style="list-style-type: none"> PCB-containing waste was appropriately treated and disposed of according to schedule. (Aburahi Facilities) PCB-containing waste was appropriately managed by lock-up, leakage control, reporting, etc. 	<ul style="list-style-type: none"> Appropriately treat PCB-containing waste according to schedule. (Kuisse Site, Settsu Plant, SPRC, Aburahi Facilities) Continue appropriate management all the way to the completion of treatment/disposal.
<ul style="list-style-type: none"> Fluorocarbon-using equipment was appropriately managed through inspection, maintenance record keeping, leakage reporting, etc. HCFC (R22)-using equipment decreased due to renewal and disposal. (Settsu Plant) 	<ul style="list-style-type: none"> Appropriately manage Fluorocarbon-using equipment (inspection, record keeping, recording of leakage amount). Promote a plan for a total ban on HCFC (R22)-using equipment.
<ul style="list-style-type: none"> Production of guidelines was launched to prevent health damage due to chemical substances to all persons related to Shionogi products. Residual liquid was thoroughly absorbed during cleansing of replacement components. (Settsu Plant) Operational SOP was revised to assess the absence/presence of antimicrobial agents in waste water to combat AMR. (Kanegasaki Plant) A unified management system was established with safety datasheets (SDSs) for Shionogi-developed products. 	<ul style="list-style-type: none"> Institute guidelines to prevent health damage due to chemical substances to all persons related to Shionogi products. Conduct appropriate environmental impact assessment of new chemical substances. (Settsu Plant) Conduct thorough management to contain antimicrobial agents. (Kanegasaki Plant) Improve SDS contents to implement rapid and stable SDS management.
<ul style="list-style-type: none"> ISO 14001 certification was continued. (Shionogi Pharma Chemical) OHSAS 18001 certification was continued. (Settsu Plant, Kanegasaki Plant) Electricity use was reduced by shortening unit workload as part of improvement activity. (Kanegasaki Plant) 	<ul style="list-style-type: none"> Promote information sharing and understanding by holding EHS committee meetings and the like. Promote employees' understanding of the EHS management system through information and education.

Shionogi Group EHS Action Targets	FY 2018 Targets
5. Ensure a sound aquatic environment. <ul style="list-style-type: none"> ■ Depollute or decontaminate used water and return it to rivers. ■ Reduce water consumption. 	<ul style="list-style-type: none"> ■ Monitor drainage of new chemicals. (Settsu Plant) ■ Consider vacuum pump water sealing and reduction of water used for cleansing. (Kanegasaki Plant) ■ Appropriately manage effluent treatment facilities; continue efforts for water consumption control and water conservation.
6. Contribute to biodiversity preservation. <ul style="list-style-type: none"> ■ Maintain and improve effective use of the Botanical Gardens. ■ Raise employees' awareness. 	<ul style="list-style-type: none"> ■ Preserve and manage rare plants, including endangered species, at Aburahi Botanical Gardens. ■ Introduce rare plants in and around Aburahi into the Botanical Gardens to preserve seeds; select and grow plants suitable for the local environment in Aburahi. ■ Turn the preservation and management of plant species into educational opportunities. ■ Exchange information with related organizations to continue activities for biodiversity. (Aburahi Facilities) ■ Appropriately manage gene recombination experiments; conduct educational programs. (SPRC, Aburahi Facilities) ■ Organize educational programs on biodiversity for awareness-raising purposes.
7. Work toward zero occupational accidents resulting in lost work time. <ul style="list-style-type: none"> ■ Reinforce health and safety education and information sharing. 	<ul style="list-style-type: none"> ■ Share information on, and organize online educational programs concerning, cases of accidents, disasters, injuries, near misses, and danger alerts, to raise employees' health and safety awareness. ■ Conduct plant patrols by those in supervisory/managerial positions.
8. Introduce EHS initiatives to the supply chain. <ul style="list-style-type: none"> ■ Support EHS initiatives by important suppliers. 	<ul style="list-style-type: none"> ■ Conduct EHS audits of important suppliers. ■ Improve auditing levels, and make them more efficient.
9. Promote health and productivity management.	<ul style="list-style-type: none"> ■ Institute "Shionogi Health Declaration 2018." ■ Pursue collaboration with health insurance associations.

Scope of application: Group companies in Japan

FY 2018 Results	FY 2019 Targets
<ul style="list-style-type: none"> ■ The disposal amount, treatment site, and drainage of liquid used for washing new product equipment were studied, and relevant decisions were made, according to newly set effluent criteria with no environmental impact. (Settsu Plant) ■ Education on effluent was provided to raise employees' awareness of environmental impact; a departmental target for water consumption was set to reinforce water-saving consciousness. (Settsu Plant) ■ Tap water consumption was reduced by 2.8 tons by improving the operating method of water purification equipment. (Kanegasaki Plant) ■ Effluent treatment facilities were appropriately managed, and efforts were continued for water conservation. 	<ul style="list-style-type: none"> ■ Water consumption: Reduced by 30% from FY 2005 (1,464,000m³) ■ Regulate release of antimicrobial agents into the environment. (AMR) ■ Study appropriate water-related risk assessment. ■ Raise personnel's awareness for efficient use of industrial water. (Kuisse Site) ■ Monitor drainage of new chemicals and wastewater from construction work. (Settsu Plant) ■ Install water-saving devices in cafeteria to reduce tap water consumption. (Kanegasaki Plant) ■ Appropriately manage effluent treatment facilities; continue efforts for water conservation.
<ul style="list-style-type: none"> ■ Rare plants, including endangered species, were preserved and managed at Aburahi Botanical Gardens. ■ Rare aquatic plants were collected around Aburahi and introduced into and cultivated at Aburahi Botanical Gardens. ■ Educational support was provided to elementary school and high school students at Aburahi Botanical Gardens. (Aburahi Facilities) ■ Gene recombination experiments were appropriately managed, and educational programs were organized. (SPRC, Aburahi Facilities) ■ Education on biodiversity was provided to employees to raise awareness. 	<ul style="list-style-type: none"> ■ Preserve and manage rare plants, including endangered species, at Aburahi Botanical Gardens. ■ Turn the preservation and management of plant species into educational opportunities. (Aburahi Facilities) ■ Appropriately manage gene recombination experiments; conduct educational programs. (SPRC, Aburahi Facilities) ■ Provide employees with education on biodiversity for awareness-raising purposes.
<ul style="list-style-type: none"> ■ Six accidents occurred resulting in lost work time. (Shionogi) ■ Information was shared on, and online educational programs were organized concerning, cases of accidents, disasters, injuries, near misses and danger alerts, to raise employees' health and safety awareness. ■ Plant patrols were conducted by those in supervisory/managerial positions. 	<ul style="list-style-type: none"> ■ Share information on, and organize online educational programs concerning, cases of accidents, disasters, injuries, near misses and danger alerts, to raise employees' health and safety awareness. ■ Conduct plant patrols by those in supervisory/managerial positions. ■ Conduct risk assessment on cases that account for 10% of reported near miss incidents in FY 2018. (Settsu Plant) ■ Adopt priority themes and conduct activity accordingly in concurrence with nationwide activities. (Kanegasaki Plant)
<ul style="list-style-type: none"> ■ EHS audits were conducted about important suppliers, including 15 audits using written documents (using a PSCI questionnaire) and 9 on-site audits, of which 5 were on-site AMR audits. ■ Personnel participated in PSCI auditor training seminar to improve auditors' level. 	<ul style="list-style-type: none"> ■ Continue document-based and on-site audits of suppliers, according to their BCP risks. ■ Conduct on-site AMR audits. ■ Continue participation in PSCI auditor training seminars.
<ul style="list-style-type: none"> ■ Shionogi was selected for the 2019 list of the "Health & Productivity" stocks (fourth consecutive year) and for the 2019 list of the Companies with Excellent Health Management. ("White 500") ■ "Shionogi Health Declaration 2018" was instituted; measures were implemented toward the achievement of focal objectives. ■ In-house (for employees) and external (for media organizations) seminars were organized to educate and raise awareness about "presentism loss." 	<ul style="list-style-type: none"> ■ Implement measures toward the achievement of focal objectives stated in the "Health Declaration 2018," in particular, "zero employees referred to instruction in lifestyle-related diseases" and "improvement on presentism loss."

9. Results

9-1 Climate Change

An early transition to a carbon-free society is now a major global challenge, as we face the growing danger of climate change with its destructive planetary impact on the economy and social systems, among others. Climate change risks and a transition to a low-carbon society are bound to impact all industrial sectors. At Shionogi, we are carefully assessing climate change risks relating to our business activities, devising and implementing measures based on our EHS policy to minimize negative repercussions.

■ Climate change risks and opportunities

At Shionogi, we view global warming and other climate change-related issues as management challenges that we should tackle in earnest. Accordingly, we are pursuing an accurate understanding of climate change risks and opportunities. The table on the following page summarizes the climate change risks and opportunities that we have thus far identified as particularly relevant to Shionogi.

In this process of identification, we extracted risks and opportunities with reference to the Task Force on Climate-related Financial Disclosures (TCFD) recommendations and the Representative Concentration Pathways 2.6 and 8.5 (RCP2.6, RCP8.5) presented in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Synthesis Report (AR5). We thus measured the financial impact and probability of occurrence of the risks and opportunities, which were reported to the Corporate Executive Meeting and on which the Board of Directors passed a resolution.

[Risks]

In the future, the need for further energy conservation is expected to lead to regulatory reinforcement. In anticipation of the risk of imposition of more rigorous energy-saving targets, we are promoting a switch to more energy-efficient equipment according to schedule, while considering the introduction of renewable energy, including solar energy for power generation.

Climate change leading to localized extreme meteorological phenomena (typhoons, torrential downpours, etc.), as well as resultant disasters and accidents (damage to facilities, flooding, power outages, etc.), point to the risk of Shionogi's factories and domestic and international suppliers being affected, or becoming unable to maintain their production or supply systems. Therefore, we are formulating company-wide business continuity plan (BCP) measures in anticipation of such eventualities, including a dual-vendor system, to prepare for a long recovery time that could otherwise result in discontinued supply. Regarding manufacturing sites in Japan, to reduce the risk of short supply following a disaster or accident, necessary measures are put in place, including plant-specific BCP measures covering various aspects including even the restoration of manufacturing equipment and inventory control, to establish a stability-assured supply system for pharmaceutical products.

[Opportunities]

We can lower the operating costs of manufacturing equipment by effectively working on climate change-related issues and pursuing activities to further reduce CO₂ emissions. In addition, given the worldwide trend of rapidly growing ESG investment, vigorous promotion of such initiatives represents the opportunity to improve external assessment by our stakeholders, enabling us to attract more investors. Shionogi is therefore actively implementing CO₂ emission-reducing measures toward medium- and long-term targets, including science-based targets (SBT), and also publishing these efforts and the results therefrom to gain positive responses from our stakeholders.

Rising average atmospheric temperatures are expected to increase the number of infectious disease outbreaks and alter the distribution of organisms transmitting infectious diseases. These developments are likely to expand the need for medicines for infectious diseases. This represents an important business opportunity for a pharmaceutical company if it is capable of adequately responding to these needs. Accordingly, Shionogi is actively pursuing several policy measures to be able to provide necessary treatment medications, while maintaining the production of its existing drugs for infectious diseases. These measures include the research and development of drugs for new infectious diseases (including drugs for neglected tropical diseases or NTDs) and contributing to and receiving funds from the Global Health Innovation Technology (GHIT) Fund for the development of antibiotics.

	Description	Financial impact	Probability of occurrence	Remarks
Transitional risk (regulatory reinforcement)	Additional investment for energy conservation	Medium (capital investment)	Intermediate	Supposing regulatory reinforcement on SBT criteria
Physical risk (extreme meteorological phenomena)	Discontinued operation due to damage to own plants	Large (discontinued operation)	Low	Supposing damage to plants due to an extreme meteorological phenomenon equivalent to the July 2018 torrential rain
Physical risk (extreme meteorological phenomena)	Discontinued operation due to damage to the supply chain	Large (discontinued operation)	Low	Supposing an increase in extreme meteorological phenomena in Asia affecting the supply chain
Opportunity (improved external assessment)	Increased investment by investors	Medium (investment opportunity)	Intermediate	Supposing improvement in ESG assessment resulting from active information disclosure via Integrated/EHS Reports
Opportunity (CO₂ emissions reduction)	Reduced electricity cost through further energy conservation	Medium (lower operating cost)	Intermediate	Supposing power consumption upon attaining conformity to SBT criteria
Opportunity (new market entry)	Profit increase from climate change-related drug discovery	Medium (profit)	Low	Supposing change in the market for tropical infectious disease (malaria) drugs

SBT

SBT (science-based targets), emissions targets based on scientific data, are also known as the corporate version of the 2-Degree Goal of the 2015 Paris Agreement. It is an international initiative to limit global warming to within 2°C above pre-industrial levels. To this end, corporations are urged to set targets compatible with a climate science-based emissions reduction scenario. Corporations adopting SBTs with a full awareness of global warming risks, and opportunities are likely to be viewed positively by institutional investors and financial organizations practicing ESG (environmental, social and governance) investment.

In FY 2018, Shionogi joined the SBT initiative of the Ministry of the Environment of Japan. With the SBT approval benchmark being revised from the 2-Degree Goal to the 1.5-Degree Goal in October 2019, it is becoming necessary to engage in energy-saving activities far more vigorously. Shionogi intends to incorporate SBTs in drawing up next medium-term goal setting, not to mention doing the necessary to respond to the 1.5-Degree Goal.

Accolades

Commendation by the Chairman of the Iwate Prefectural Liaison Council on Environmental Protection

In May 2019, the Kanegasaki Plant was commended by the Chairman of the Iwate Prefectural Liaison Council on Environmental Protection in recognition of the plant's excellent environmental consideration as a business establishment. Concretely, the plant was highly evaluated for its co-generation system and energy-saving and flexible power consumption regulating systems making the most of the LNG satellite station, among many other measures for environmental protection.

Ranked "S" for the fourth consecutive year in the assessment of business operators under the Energy Conservation Act

In FY 2016, a system was established under the Energy Conservation Act to evaluate and classify business operators into four ranks (S, A, B, and C) according to their energy conservation initiatives, thereby publicly announcing their environmental performance. Shionogi has been ranked "S" for the fourth consecutive year as an excellent business operator practicing advanced energy-saving initiatives.



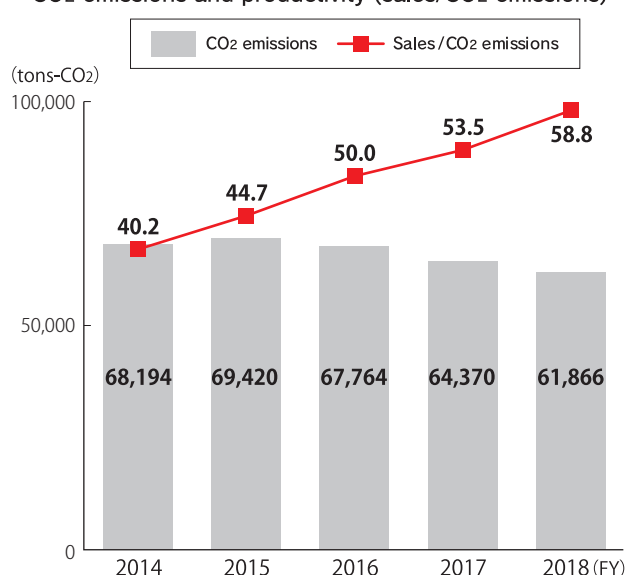
CO2 emissions

The Shionogi Group is actively working to reduce CO2 emissions to contribute to global warming mitigation.

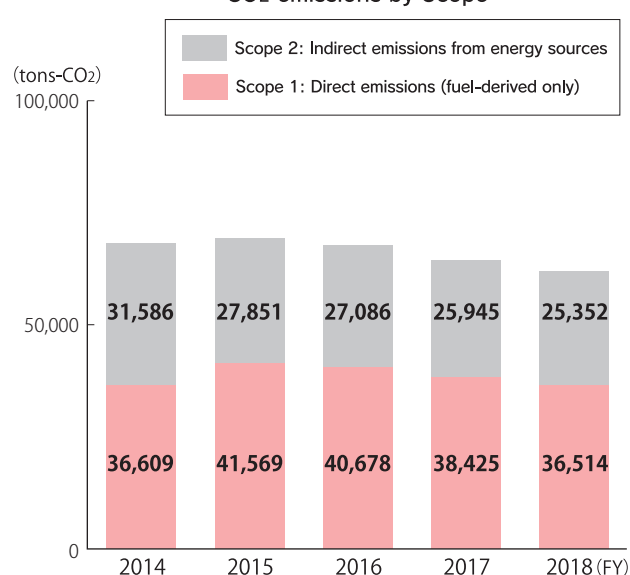
The Federation of Pharmaceutical Manufacturers' Associations of Japan (FPMAJ) has adopted the goal of reducing CO2 emissions by pharmaceutical companies by 23% in FY 2020 (Phase I) and by 25% in FY 2030 (Phase II) from the FY 2005 benchmark as part of the FPMAJ's action plan to realize a low-carbon society. As an FPMAJ member, the Shionogi Group has set similar targets, including some voluntarily set above those of the trade organization. We also have an energy efficiency improvement target, a 1% improvement in specific energy efficiencies each year, toward which we are promoting the installation of highly energy-efficient equipment to reduce energy consumption. Moreover, we review our operational methods continuously.

Shionogi's CO2 emissions have been steadily decreasing, even following a marked drop in FY 2014 attributed to the fuel switch.

CO2 emissions and productivity (sales/CO2 emissions)

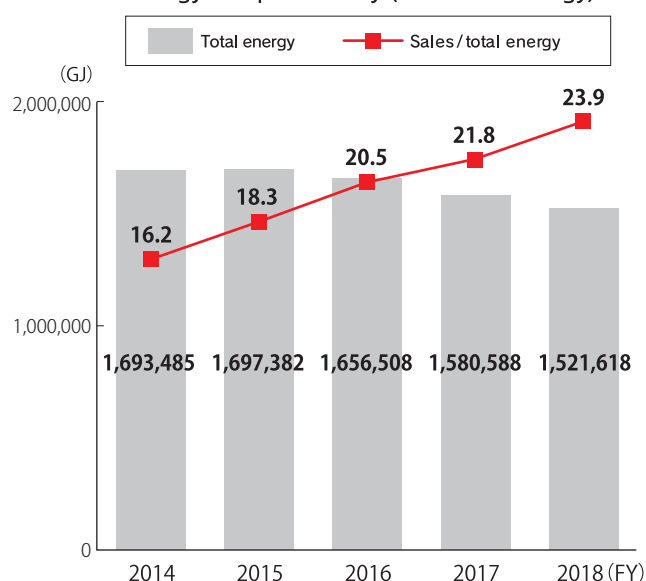


CO2 emissions by Scope

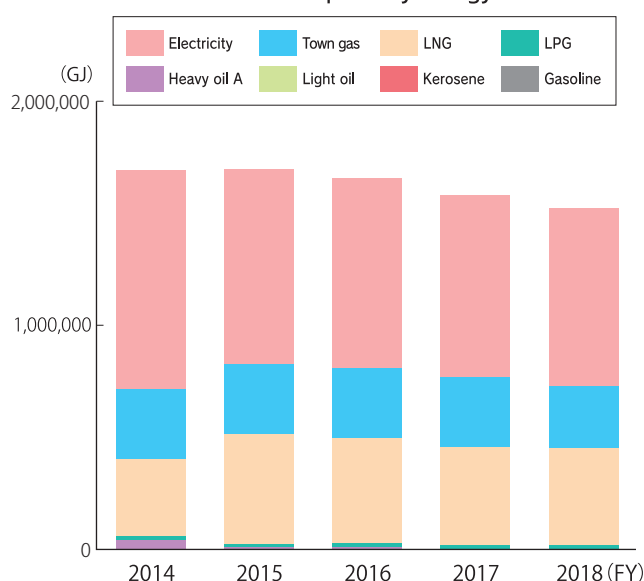


Energy consumption

Total energy and productivity (sales/total energy)



Consumption by energy



■ Fluorocarbons

In April 2015, the revised Act on Rational Use and Proper Management of Fluorocarbons came into force, making it mandatory for business operators to inspect refrigeration and air-conditioning equipment and report leakage. Accordingly, Shionogi has identified applicable equipment, commencing systems of conducting simplified and periodic inspections, filing records, and calculating the amount of leakage.

In FY 2018, Shionogi's calculated Fluorocarbon leakage amounted to 599 tons-CO₂. With the Kigali Amendment to the Montreal Protocol*¹ now in force, we are promoting a switch to Fluorocarbon-free or low-GWP*² equipment on the occasion of renewal.

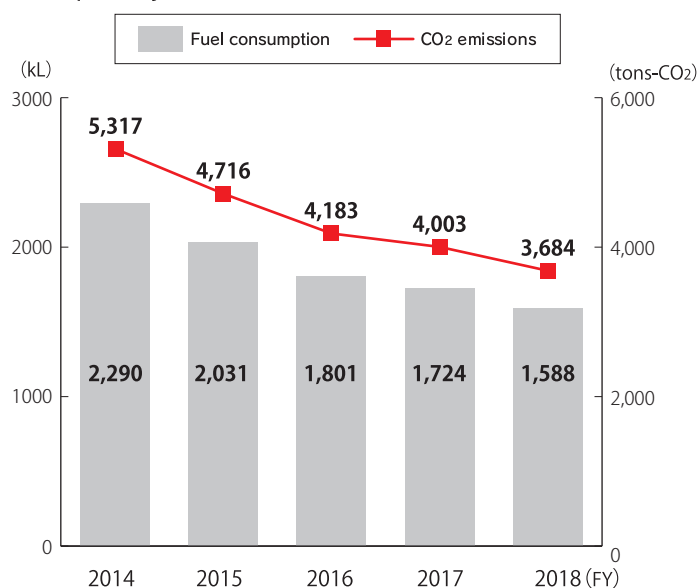
* 1 The Montreal Protocol on Substances that Deplete the Ozone Layer, based on the Vienna Convention for the Protection of the Ozone Layer, restricts substances likely to destroy the ozone layer, namely chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). The Kigali Amendment to the Montreal Protocol, in force since January 2019, includes the restriction of production and consumption of hydrofluorocarbons (HFCs), a non-ozone-depleting CFC alternative with a high greenhouse effect.

* 2 GWP: Global Warming Potential

■ Vehicles for sales activities

Shionogi is striving to reduce CO₂ and gas emissions by improving fuel efficiency through, for example, promoting the introduction of more fuel-efficient hybrid vehicles (HVs) to be rented by our medical representatives (MRs). All vehicles for use by MRs in Japan are now HVs, except in cold regions.

Fuel consumption by and CO₂ emissions from vehicles for sales activities

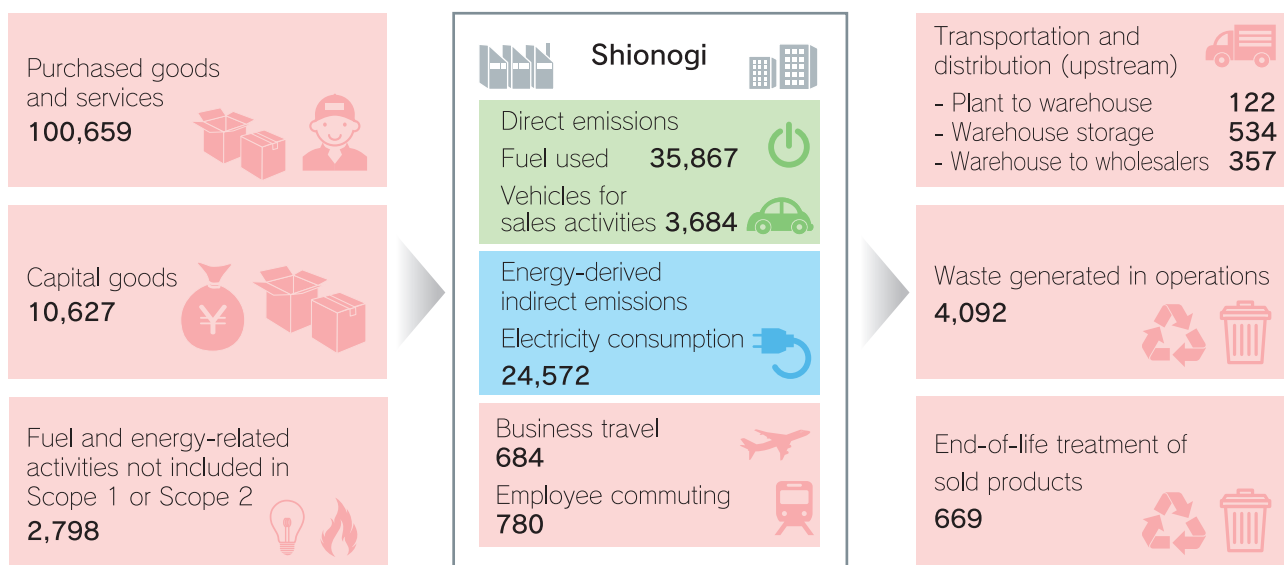


■ Scope 3 (Greenhouse gas emissions throughout the supply chain)

A company's business activities form a supply chain of its trade partners through purchasing, sales and so forth. For truly effective CO₂ emission control, it is essential to measure CO₂ emissions not only from the company's own activities but also throughout the supply chain.

At Shionogi, we measure our CO₂ emissions throughout the supply chain of purchase/procurement, manufacturing, distribution, and sales in accordance with the "Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain" published by the Ministry of the Environment and the Ministry of Economy, Trade and Industry of Japan.

(Unit: tons-CO₂)



Scope 1 : Direct emissions from the company's fuel use and industrial processes

Scope 2 : Indirect emissions accompanying the consumption of electricity and thermal energy purchased by the company

Scope 3 : Indirect emissions from the supply chain other than those under Scope 1 and 2

(Unit: tons-CO₂)

	Category	FY 2016 results	FY 2017 results	FY 2018 results	Calculation basis (Guidelines)
Scope1	Direct emissions				
	Fuel used	39,970	37,942	35,867	Amount of fuel used as defined under the Act on the Rational Use of Energy
	Vehicles for sales activities	4,183	4,003	3,684	Amount of fuel used for vehicles for sales activities
Scope2	Energy-derived indirect emissions	26,456	25,221	24,572	Amount of electricity purchased as defined under the Act on the Rational Use of Energy
Scope3	Purchased goods and services	145,475	128,468	100,659	Purchase price of raw materials and merchandise purchased
	Capital goods	98,022	58,283	10,627	Acquisition price of fixed assets newly acquired in the year
	Fuel and energy-related activities not included in Scope 1 or Scope 2	3,015	2,876	2,798	Amount of electricity purchased
	Transportation and distribution				・Transportation and distribution of raw materials are not included ・Downstream Transportation and distribution of products (weight and distance)
	- Plant to warehouse	201	144	122	- Plant to warehouse
	- Warehouse storage	351	388	534	- Warehouse storage
	- Warehouse to wholesalers	313	386	357	- Warehouse to wholesalers
	Waste generated in operations	4,110	3,797	4,092	Weight of waste materials classified by type
	Business travel	521	703	684	Number of employees
	Employee commuting	819	800	780	Travel expenses calculated for each means of transportation (calculated based on the number of employees until FY 2015)
	End-of-life treatment of sold products	850	915	669	Amount used by type as classified under the Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging

The calculation bases are as indicated in the "Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain (Ver. 2.5)" of the Ministry of the Environment and the Ministry of Economy, Trade and Industry of Japan.

9-2 Water

Water is a source of life that circulates the globe and benefits humans and diverse ecosystems through interactions with the atmosphere, soil and other elements. Water shortage and pollution are causes of great concern for the future due to the continuing increase in the world population and economic expansion. Climate change is most likely to further deteriorate the situation. At Shionogi, we are acutely aware of the ramifications of water-related risks on the production of pharmaceutical products, as well as all aspects of our corporate life. Accordingly, we conduct careful risk assessment, taking appropriate measures based on the EHS policy to minimize risks.

[Risks and opportunities]

Quality water is an essential resource to manufacture pharmaceutical products. Considering the great impact on business continuity of possible depletion of water resources in the catchment areas where our plants are located, we used the internationally recognized WRI Aqueduct*1 and WWF Risk Filter*2 to assess water risks facing our major operating sites engaged in manufacturing and research. The risk items studied include those related to water supply necessary for its present operations and future business continuity, and the increase in the probability of occurrence of floods triggered by extreme meteorological phenomena attributable to climate change.

In-house deliberations based on the results of these studies, as well as past experience and knowledge, have concluded that water risks are relatively minor for the Shionogi Group at present and in the future. We have incorporated risk assessment based on the WRI Aqueduct into the selection of our suppliers to clarify their latent risks and prevent their development.

For future water-related risk assessment, we are considering consultation with experts.

*1 Water risk assessment tool developed and published by the WRI (World Resources Institute)

*2 Water risk assessment tool developed and published by the WWF (World Wide Fund for Nature)

WRI Aqueduct Assessment Results (Baseline Water Stress)

Company	Location	No. of operating sites	Risk level/no. of operating sites					Future water stress change
			High	High to medium	Medium	Medium to low	Low	
Shionogi	Japan (Iwate, Shiga, Osaka, Hyogo)	5	—	3	1	1	—	No major change up to 2040
Shionogi Pharma Chemicals	Japan (Tokushima)	1	—	—	—	—	1	No major change up to 2040
C&O Nanjing Plant	China (Jiangsu)	1	—	—	—	1	—	No major change up to 2040

WWF-Water Risk Filter Assessment (Baseline Water Stress)

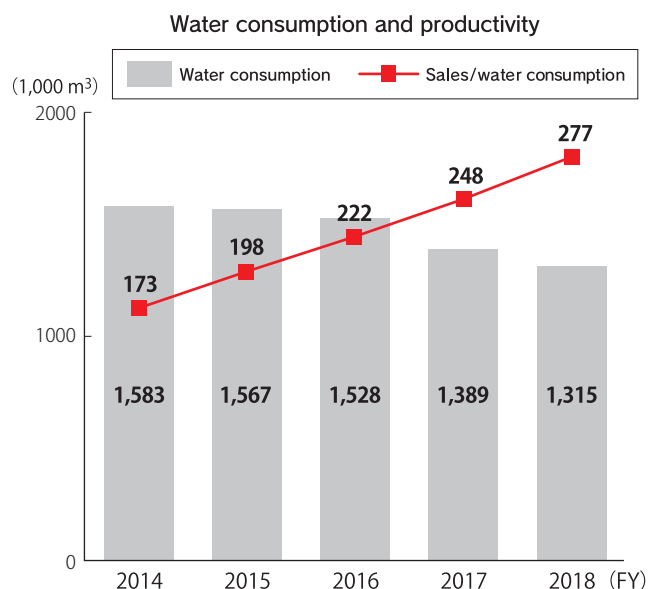
Company	Location	No. of operating sites	Risk level/no. of operating sites				
			High	High to medium	Medium	Medium to low	Low
Shionogi	Japan (Iwate, Shiga, Osaka, Hyogo)	5	—	—	4	1	—
Shionogi Pharma Chemicals	Japan (Tokushima)	1	—	—	—	—	1
C&O Nanjing Plant	China (Jiangsu)	1	—	—	—	1	—

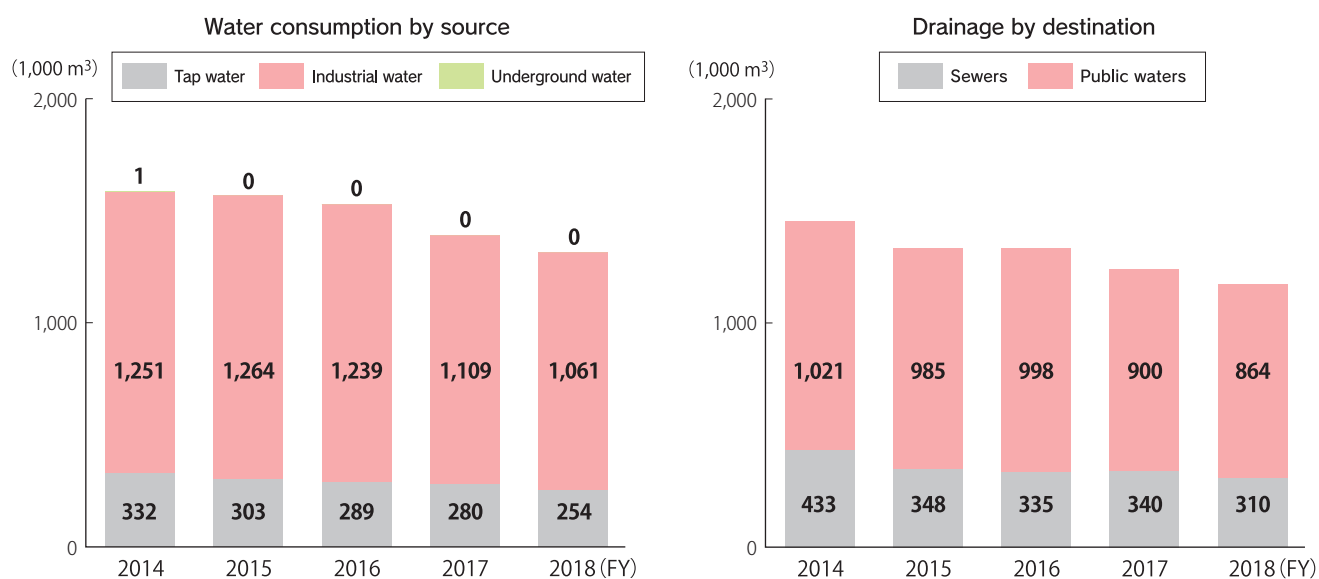
Self-assessment

Water risk category		Risks and opportunities	Financial impact	Probability of occurrence	Remarks
Physical risk	Water shortage	Discontinued operation due to droughts	Large (discontinued operation)	Low	Has not occurred in at least the last 30 years
	Water excess	Discontinued operation due to floods	Large (discontinued operation)	Low	Has not occurred in at least the last 30 years
	Water quality deterioration	Site operation suspended due to water quality deterioration	Large (discontinued operation)	Low	Has not occurred in at least the last 30 years
Regulatory risk		Additional investment in waste water treatment following reinforced waste water quality criteria	Medium (capital investment)	Intermediate	Respond to applicable administrative policies in all sincerity
Reputation risk		Compromised public confidence due to environmental pollution by waste water from the site	Large (compromised confidence)	Low	Recovering public confidence is difficult; must focus effort on this risk item

Water consumption

To protect water, the Shionogi Group keeps accurate measures of its water consumption, both tap water and industrial water, and strives to conserve water by reviewing its manufacturing equipment operation and cleansing methods. We obtain the water we use entirely from the public water supply system, with no direct water intake from underground, rivers or the sea. We release waste water into sewers or rivers, not into the sea. Our waste water, purified by in-house treatment facilities and constantly monitored for any abnormality, conform to our management criteria, which are voluntarily set more stringently than those mandated by laws and regulations. The quantity of actual water consumption by the operating sites corresponds to about 10% of the quantity of water taken in, since a large part of the water used for our activities is returned to the aquatic environment.





■ Environmental impact assessment of pharmaceutical ingredients contained in waste water

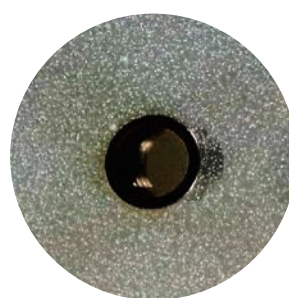
In the facilities where antimicrobials are produced, we first deactivate antimicrobials contained in waste water and release it into in-house waste water treatment facilities, confirming that the level of antimicrobial content is void of environmental threat if the waste water is released into the environment. With regard to substances other than antimicrobials, at the outset of manufacturing each new product, we confirm that its pharmaceutical ingredients contained in treated wastewater do not have any impact on the natural environment.

(For a related subject, refer to “AMR” on p. 9.)

Testing the activity of an antimicrobial



Before inactivation
(inhibition circle formed)



After inactivation
(inhibition circle not formed)

9-3 Resource Circulation

The world population increase and economic expansion have brought about mass production, mass consumption, and mass disposal in our society, giving rise to serious environmental problems such as the depletion of natural resources, the destruction of the natural environment, and the rapidly growing need for sites for final waste disposal. Now the conservation of natural resources and environmental impact reduction are strongly being called for. More recently, environmental pollution due to marine plastic waste has also become a global issue.

In such a situation, Shionogi is striving to restrict waste generation and promote the reuse and recycling of resources based on its EHS policy, as it uses and disposes of numerous resources as raw materials of pharmaceutical products and research materials. With regard to plastics, Shionogi is promoting appropriate disposal and reduction in the amount of plastics used for products.

(For Shionogi's plastic-related initiatives, refer to "Topics" on p. 8.)

[Risk and opportunities]

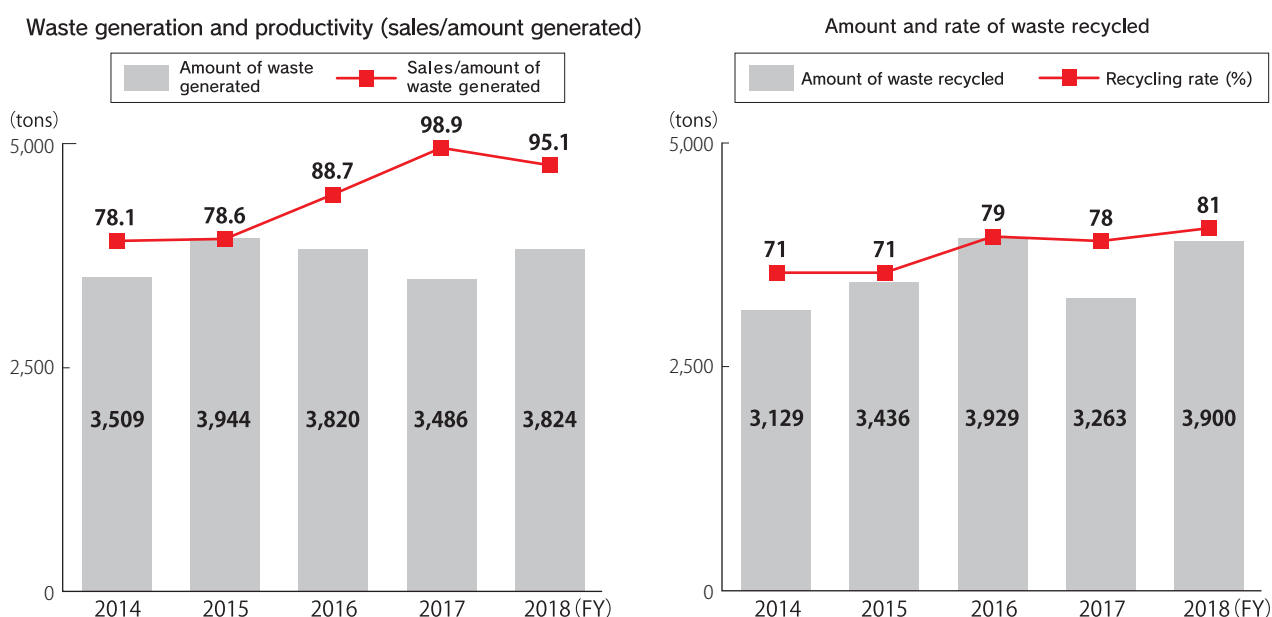
Shionogi disposes of about 3,800 tons of waste and 260 tons of plastic, and uses about 730 tons of plastics for products. Their impact on the environment is slight, but Shionogi is determined to continue to work on this social challenge of minimizing the negative impact on the environment.

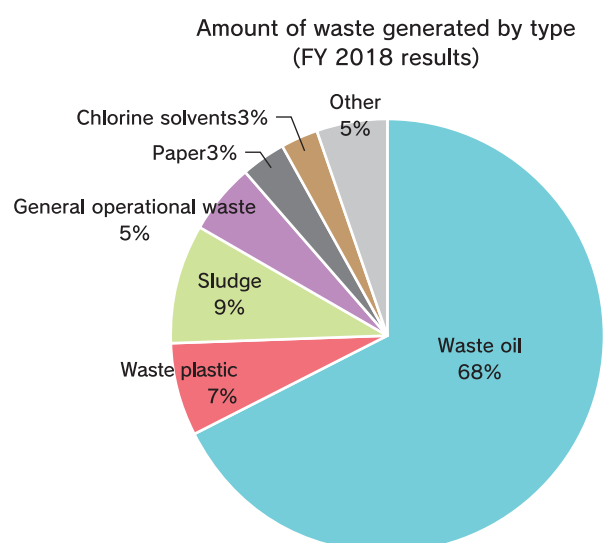
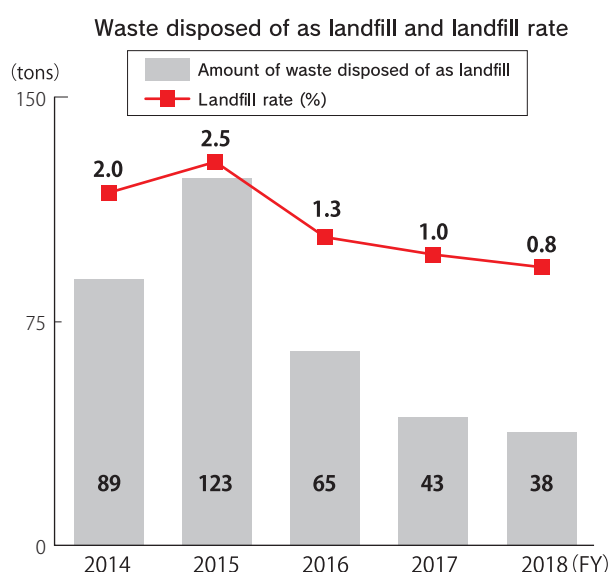
Resource Conservation and Waste Treatment

As part of its voluntary action plan to realize a reuse-and recycling-oriented society, FPMAJ has adopted the goals of reducing the amount of industrial waste disposed of as landfill in FY 2020 by 70% from the FY 2000 actual results and of reusing or recycling at least 55% of industrial waste in FY 2020. To contribute to the achievement of these goals as an FPMAJ member, the Shionogi Group has set its numerical targets for FY 2020, considering the manufacturing situations at the operating sites and the progress of related measures.

Waste materials generated within the Shionogi Group mainly include waste oils resulting from its manufacturing processes, sludge from used water treatment, and plastics used in product containers. We practice the "3R" approach (Reduce, Reuse, and Recycle) mainly by improving manufacturing processes, selling collected usable plastic and metal waste, and reducing liquid waste. With regard to plastics, we are striving to reduce the amount of waste by implementing thorough sorting of waste materials, ensuring appropriate handling by commissioned waste disposal service providers, and participating in community-based waste collection to prevent marine inflow.

Shionogi obtains its recycling rate by taking the amount of waste sold plus the amount reused/recycled and dividing it by the amount of waste generated. The landfill rate is defined as the amount disposed of as landfill divided by the amount of waste generated.





■ Prevention of illegal dumping

To prevent illegal dumping of industrial waste, Shionogi takes great care in selecting the business operators to whom we consign waste transportation, treatment or disposal. In our selection, we give priority to those officially recognized for their quality services, followed by others selected on the basis of their business licenses, treatment/disposal facilities, operational conditions, document management status, implementation of emergency drills, and so forth, using our contractor evaluation sheet. Upon selecting the operators, we ensure the appropriate management of contractual documents, licenses, and manifests (waste management sheets), conducting at least one on-site inspection per year for each operator.

■ Reuse and recycling of product containers and packaging materials

In compliance with the Containers and Packaging Recycling Act, a part of the containers and packaging materials used for the products sold by Shionogi are reused or recycled. At Shionogi, we are striving to reduce our environmental impact by modifying container materials and packaging forms, while making sure to maintain and improve product quality.

Containers and packaging materials used, amount consigned for reuse/recycling (FY 2018 results) (tons)

	Containers and packaging materials used	Amount consigned for reuse/recycling
Plastic	735	155
Paper	483	12
Glass (transparent)	38	8
Glass (brown)	8	2

Reuse/recycling consignment fee: 8,755,000 yen

■ In-house reuse/recycling of resources

Organic solvents used during the manufacturing process of active pharmaceutical ingredients at the Kanegasaki Plant, such as dichloromethane, ethyl acetate, and methanol, are collected in-house for reuse, thus ensuring the effective use of resources and regulating waste generation.

■ Clean-up activities

Environmental pollution caused by marine plastic waste has become a major global issue. Since plastic waste generated overland can flow into the sea, carried by rain and wind via rivers, Shionogi personnel at the respective operating sites participate in clean-ups along the surrounding roads, removal of illegal posters, and other such initiatives organized in the local communities.



Clean-up (Kanegasaki Plant)

9-4 Chemical Substances

The research, development and manufacturing of pharmaceutical products involve the use of numerous types of chemical substances. Some of them can adversely impact human health, ecosystems, and the global environment. The handling of chemical substances is governed by the Pollutant Release and Transfer Register (PRTR) Act and various other laws and regulations. It goes without saying that Shionogi strictly adheres to these rules. We also make sure to appropriately manage chemical substances by regulating their release into the atmosphere, sewers and public waters in accordance with our voluntary criteria, which are stricter than those imposed by related laws and regulations. We consider these actions to be extremely important in terms of compliance and reputation.

[Risks and opportunities]

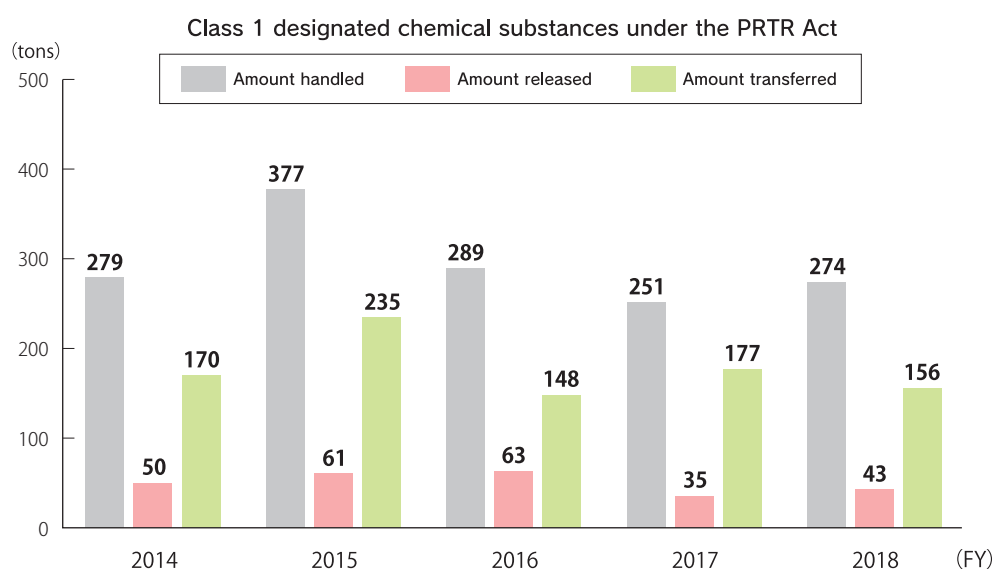
Shionogi has always strictly controlled the release of antimicrobials into the environment over the many years it has engaged in the development, manufacture and sale of antimicrobials. Since antimicrobial resistance (AMR) is believed to be caused not only by the inappropriate or excessive administration of antimicrobials but also by their release into the environment from pharmaceutical manufacturing plants, it is essential to devise and implement countermeasures from various aspects. As a pharmaceutical company that manufactures antimicrobials, we believe it is imperative to regulate the emergence of AMR, which is now a global challenge, working in collaboration with our suppliers.

(For Shionogi's anti-AMR initiative, refer to "Topics" on pp. 9-10.)

■ PRTR

In compliance with the Pollutant Release and Transfer Register (PRTR) Act, under which it is mandatory to record, calculate and publish the status of release of chemical substances into the environment, Shionogi submits relevant data to the authorities and manages the handle, release and transfer of volatile organic compounds (VOCs). We intend to continue the appropriate management of such handle, release and transfer to reduce the impact that our operations may have on the environment.

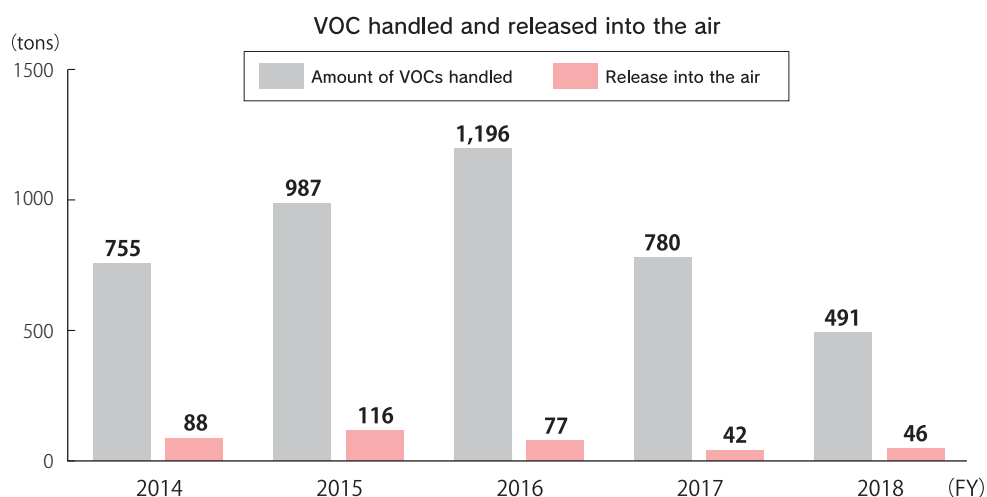
Under the PRTR, the release into the air and rivers, disposal, and recycling of chemical substances used are recorded and reported to the authorities under the headings indicated in the table below. The "amount transferred" to "outside operating sites" refers to the amount handled as waste.



Chemical substances to be registered under the PRTR Act

(Unit: kg)

Substance name	Amount handled	Amount released			Amount transferred	
		Air	Public waters	Soil	Outside operating sites	Sewers
<i>N,N</i> -dimethylacetamide	6,609	0	0	0	6,609	0
<i>N,N</i> -dimethylformamide	3,336	10	0	0	3,326	0
Acetonitrile	99,276	1,498	0	0	58,556	0
Chloroform	7,523	284	0	0	7,238	0
Dichloromethane (methylene chloride)	121,033	40,621	1	0	60,918	0
Triethylamine	1,217	12	0	0	1,205	0
Tributylamine	7,885	0	0	0	0	0
Toluene	1,174	6	0	0	1,168	0
N-hexane	7,274	417	0	0	6,857	0
Pyridine	17,955	0	0	0	9,687	0
Benzene	711	0	0	0	133	0



PCB

Polychlorinated biphenyls (PCBs) are a cause of great concern in terms of global-scale contamination because they do not easily biodegrade in the environment but easily accumulate in the bodies of living organisms through the food chain. Since PCBs were used in numerous items such as condensers, transformers and fluorescent light ballasts in the past, it is imperative that all materials containing PCBs, whether they are being replaced or are still in use, be appropriately managed to contain their impact. At Shionogi, personnel are appointed to appropriately manage PCB-containing materials, while their treatment and disposal are continued according to a medium-term plan. In FY 2018, the disposal of all materials containing PCBs was completed at the Aburahi Facilities. The remaining disposal is scheduled for completion by 2021.

Environmental and safety assessment of chemical processes

Shionogi performs preliminary assessment of the safety of chemical substances and the danger of reaction and incompatibility in the development stage of manufacturing and testing methods for pharmaceutical compounds and candidate compounds, and in the designing stage of related equipment. We also continue to explore production processes that lead to greater efficiency in terms of waste reduction, energy conservation, and the like in the manufacturing stage. In FY 2018, we conducted environmental and safety assessment and education concerning a total of 61 processes of 22 articles. Shionogi representatives regularly attend the process safety study group events organized by JPMA, such as lectures on hazards in chemical processes and safety assessment, reports on cases, and factory visits. These events enable Shionogi to collect useful information, allowing us to continue to improve the safety of our chemical processes.

9-5 Pollution Prevention

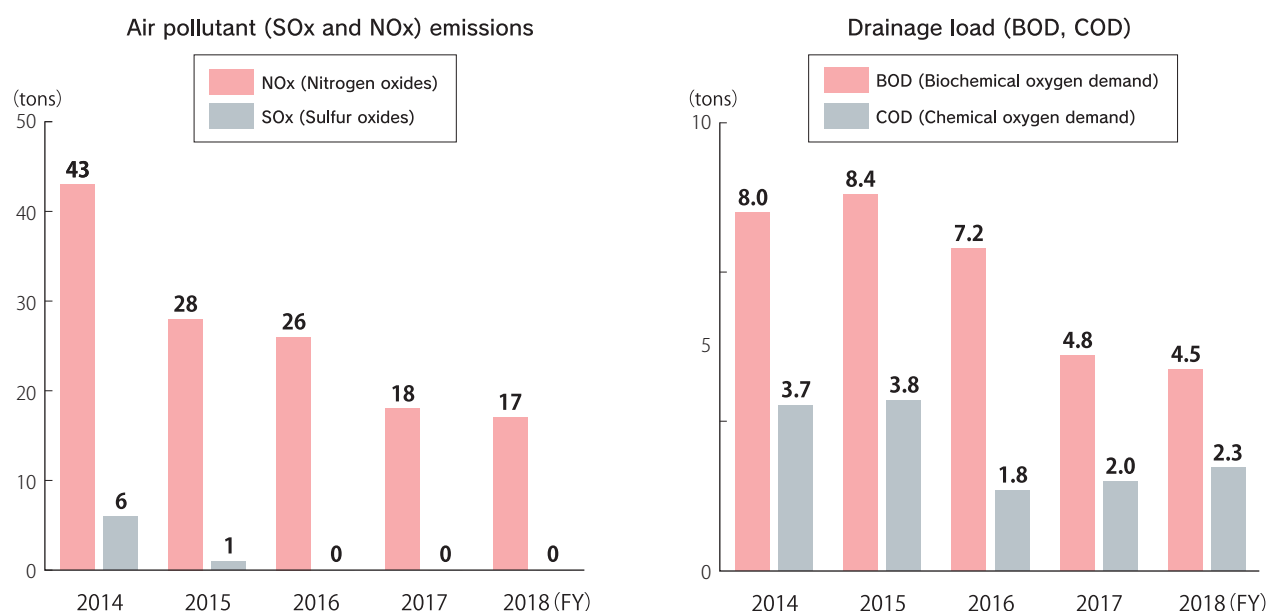
Environmental pollution caused by exhaust gas, waste water, and waste materials containing toxic substances resulting from business operation adversely impacts human health and ecosystems. Pollution can also be caused by the use of products and discarded unneeded products. In Japan, waste materials and toxic substances resulting from the country's industrialization and economic growth starting in the second half of the 1900s seriously polluted the air, aquatic areas, soil, and underground water, causing various serious cases of pollution harming human health. Today, pollution prevention continues to be an essential social challenge in protecting people's health and the daily environment. Once a company allows environmental pollution to occur, it can only recover its original state by investing enormous time and cost, and its reputation will be severely compromised.

At Shionogi, we consider legal compliance as the very foundation of our corporate existence. Compliance with EHS-related laws and regulations is an integral part of our EHS policy. To prevent pollution, we strictly observe laws and regulations governing air, water and soil pollution and assess the status of compliance under our EHS management system. As concrete actions, Shionogi has always made the effort to reduce pollution risks by operating in-house waste water treatment facilities and managing pollutant factors through periodic monitoring.

■ Prevention of air, water and soil pollution

To prevent air pollution, Shionogi strictly observes the regulatory values for NO_x, SO_x, and particulate matter, while reducing SO_x generation through boiler fuel conversion. To prevent contamination in sewers and rivers, we have adopted voluntary control values for pollutants that are far stricter than the legal and regulatory values, carrying out round-the-clock monitoring with the use of total organic carbon (TOC) analyzers and oil content monitoring devices. At the Kanegasaki Plant, Aburahi Facilities, and Shionogi Pharma Chemicals, waste water is treated and purified at the facilities on their premises before it is released into nearby rivers.

The Kanegasaki Plant, which handles large quantities of chemical substances, has voluntary control values for soil, taking measurements periodically. The measurements have thus far all fallen well below the applicable environmental criteria.



■ Compliance with Related Laws and Regulations

Environment-related laws and regulations vary, encompassing a wide spectrum from waste and energy management to the prevention of air and water pollution and the management of chemical substances. To ensure thorough compliance, we share information on legal and regulatory revisions at the respective operating sites, organize educational programs, and compile relevant information and knowledge in manuals and other forms. We also conduct a periodic assessment of the status of legal and regulatory compliance. As with environmental matters, we also promote legal and regulatory compliance and assessment with regard to health and safety affairs. To this date, we have never been subject to litigation or penalties for violations EHS-related violations.

In FY 2018, the Shionogi Pharmaceutical Research Center registered one case of leakage containing a radioisotope (RI) from a waste water pipe. The incident was due to partial corrosion in a section of the pipe inside the building. The amount of leakage was small, and the RI dose in the waste water was extremely small, posing no threat of radioactive damage. The incident was immediately reported to the Nuclear Regulation Authority, and necessary action was taken. There was no leakage outside the Center premises and no injuries.

The Kuise Site received one complaint about the noise generated during building demolition work and the dispersal of dust and sand. The Kuise Site immediately responded by operating heavy machinery with greater care, installing additional partitions, and sprinkling water without fail.

Number of incidents of excess emissions (exceeding legal restrictions) (Cases)

FY	2014	2015	2016	2017	2018
Shionogi	0	0	0	1	0
Group companies	0	0	0	0	0

環境苦情件数の推移 (Cases)

FY	2014	2015	2016	2017	2018
Shionogi	1	1	1	2	1
Group companies	0	0	0	0	0

9-6 Biodiversity

In January 2012, the JPMA announced its Basic Principles and Action Guidelines for Biodiversity. As a JPMA member, the Shionogi Group has set goals for its environmental activities with a focus on biodiversity, promoting related employee education while adhering to the Act Concerning the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms (“Cartagena Act”) and the Invasive Alien Species Act.

The Botanical Gardens of the Aburahi Facilities own rare plants, including endangered species, which are protected in consideration of their adaptability to the site environment. The Botanical Gardens interact with local students, offering educational opportunities through the conservation and management of plants. Shionogi intends to continue such activities, managing and protecting the Botanical Gardens and using them to support education in the local community.

In the program for Aburahi Elementary School, which now has an herb garden on the school grounds, the Aburahi Facilities organize workshops in which pupils try their hand at dyeing goods with dyes taken from indigo plants and purple gromwell cultivated in the herb garden, and classes in which pupils learn about plants by touching and observing plant roots, leaves, seeds, and fruits in the Botanical Gardens. These events are organized in partnership with Kusuri Gakushukan (Pharmacological Learning Center) in Koga City and other local corporations, with experts from the botanical gardens of Kobe and Kyoto Pharmaceutical Universities serving as guest lecturers. The events are highly appreciated as initiatives that support children's learning for the future through collaboration among local government, academia and industry.



Scenes from elementary school programs

“Shiga Prefecture Certificate of Biodiversity Initiatives” for the Botanical Gardens

The Botanical Gardens of the Aburahi Facilities has obtained a “Shiga Prefecture Certificate of Biodiversity Initiatives (One Star)” in recognition of the community activities viewed as effective initiatives for the protection of biodiversity and the sustainable use of natural resources.



9-7 Environmental Accounting

Shionogi practices environmental accounting based on the Environmental Accounting Guidelines of the Ministry of the Environment of Japan. Environmental accounting enables us to clarify the environmental protection costs and benefits from related activities and to quantitatively manage initiatives for environmental protection. In FY 2018, our main investment items included the replacement of air-conditioning systems and lighting fixtures with higher-efficiency models, resulting in global warming control costs. The main cost items included a pollution prevention cost arising mainly from the maintenance and management of exhaust gas and waste water treatment facilities and dichloromethane absorption and recovery equipment, and a resource circulation cost for waste treatment and disposal. The actual economic benefits included profit from the sale of waste liquids, metal scrap, and other recyclable resources and a reduction in energy costs, mainly for electricity and gas, through the revision of manufacturing and air-conditioning equipment.

Accounting scope

Accounting covers the period from April 1, 2018 through March 31, 2019, and its scope includes Shionogi & Co., Ltd. and Shionogi Group companies in Japan.

Environmental protection costs were calculated by proportional distribution according to the percentages related to environmental protection. Economic benefits from environmental protection measures were calculated by taking into account only effects that are calculated based on objectively verifiable grounds (actual effects).

Environmental protection costs

Category		Key activities	Investment (in 1,000 yen)	Cost (in 1,000 yen)
(1) Business area cost			2,779	510,984
items	① Pollution prevention cost	<ul style="list-style-type: none"> · Maintenance and management of exhaust gas treatment equipment · Maintenance and management of wastewater treatment facilities · Dichloromethane processing equipment · Measurement and analysis cost for the above 	0	243,454
	② Global environment protection cost	<ul style="list-style-type: none"> · Renewal of air-conditioning systems, refrigerators, and lighting fixtures · Operational improvement of manufacturing and air-conditioning facilities 	2,779	99,987
	③ Resource circulation cost	<ul style="list-style-type: none"> · Recycling and treatment of waste solvents · Recycling and treatment of general waste materials · Recycling and treatment of industrial waste 	0	167,543
(2) Upstream/downstream cost		Consignment of reuse of containers and packaging	0	7,804
(3) Administration cost		<ul style="list-style-type: none"> · Maintenance and operation of environmental management systems · Development and maintenance of green zones 	0	313,768
(4) R&D cost			0	0
(5) Social activity cost		<ul style="list-style-type: none"> · Contribution to environmental organizations · Communication with local communities 	0	651
(6) Environmental remediation cost		· Imposition on Pollution Load	0	185
Total			2,779	833,392

Economic benefits from environmental protection (actual positive effects)

Description		Amount of money (in 1,000 yen)
Benefit	Business income from recycling of waste	9,016
Cost reduction	Reduction in energy and water expenses	7,575
Total		16,592

9-8 Occupational Health and Safety

At Shionogi, we are constantly making effort to ensure employees' health and safety and create and maintain a comfortable workplace environment. We have thus developed a management system to this end, holding health and safety committee meetings to devise measures to prevent occupational accidents and enhance workplace health and safety.

FY	2018	FY	2018
Occupational accidents	15 cases	Frequency rate*1	0.807
Of which those resulting in lost work time	6 cases	Severity rate*2	0.018

The numbers of accidents are those at Shionogi & Co., Ltd. alone, excluding accidents during commuting.

* 1 Frequency rate: Frequency of accidents; the number of employees killed or injured in occupational accidents per one million total working hours

* 2 Severity rate: Severity of accidents; the number of work days lost due to occupational accidents per one thousand total working hours

The Settsu and Kanegasaki Plants have OHSAS 18001 certification (standard for occupational health and safety management systems), pursuing continuous improvement under their certified management system. The plants have in-house criteria for goal-oriented performance progress management and risk management. Criteria-based risk assessment is conducted with a focus on risk items identified as particularly important. Criteria are also set for the risk assessment of chemical substances, with the chemicals actually handled in the operations subjected to such assessment. Notifications and other communications of information from administrative authorities are appropriately handled with in-house measures, required formalities, and the like.

To prevent occupational accidents involving chemical substances and realize a safety-secured working environment, we pursue continuous improvement with a focus on the development of the safety data sheet (SDS)-based management system and the enhancement of guidelines concerning chemical hazards.

■ Guidelines concerning chemical hazards

The development and manufacturing of pharmaceutical products sometimes involve the handling of chemical substances whose use is not restricted under law because little information is available on their toxicity and other possibly hazardous properties. In handling such chemicals, it is essential to assess related risks from the standpoint of the health and safety of not only patients but also related personnel, establishing and maintaining facilities capable of containing the chemicals up to the level where employee health can be assured. To prevent occupational accidents involving chemical substances and realize a safety-secured working environment, Shionogi is working on the enhancement of guidelines concerning chemical hazards in conformity with representative global standards.

■ Vehicles for sales activities

To reduce road accidents involving Shionogi's vehicles used for sales activities, we have taken both tangible and intangible measures. Tangible measures include the introduction of vehicles installed with an automatic braking system and an around-view monitor system and the scheduled gradual introduction of telematics,* which we have started examining to collect driving records. As intangible measures, road safety campaign slogans are adopted, and road safety seminars and workshops are held to raise employees' awareness of the importance of safe driving on a daily basis.

* Telematics: Internet-based centralized management of vehicles to improve their safety and security functions and conveniences aided by informatics.

■ Commendation

Reiwa Era Year One Commendation for Health and Safety (Encouragement Award) by the Director of the Tokushima Labor Bureau (Shionogi Pharma Chemicals Tokushima Plant)

The Tokushima Plant of Shionogi Pharma Chemicals Co., Ltd. was officially commended in recognition of its model operation: no operational accidents resulting in lost work time since the end of June 2011 and strong commitment to health and safety activities, including the safety assessment of chemical processes based on a management plan and the active (frequent), accurate and appropriate implementation of chemical substance management. In other words, the Tokushima Plant has been recognized as being exemplary vis-à-vis other industrial sites in its approach to health and safety challenges.



Tokushima Plant personnel with the certificate of commendation

9-9 Health Management

■ Selected as one of the “Health & Productivity” stocks for the fourth consecutive year

At Shionogi, we uphold the company policy “shionogi strives constantly to supply the best possible medicine to protect the health and well-being of the patients we serve.” We believe that, in order to put this policy into action, it is most important that all Shionogi employees maintain and enhance their mental and physical health to be able to work in good spirits, with all members of their families who support them also in good health, leading a sound family life. Accordingly, we announced the “Shionogi Health Declaration 2018,” thus committing ourselves to enhancing and maintaining the good health of all of our employees and their families, cultivating a corporate culture that champions good health and healthy habits and further developing an environment that encourages all to pursue good health, all through concerted efforts by the Company and the corporate health insurance association.

<Shionogi Health Declaration 2018>

http://www.shionogi.co.jp/en/company/csr/activities/pdf/health_declaration_2018.pdf

The following are the five focal points of the Shionogi Health Declaration 2018. For their realization, we are carrying out a range of policy measures to allow the employees to fully demonstrate their abilities at work.

1. Maintain a 100% health checkup receipt rate on a domestic consolidated basis, and promote awareness-raising activities at overseas group companies.

We intend to maintain the rate of participation in periodic physical checkups among Shionogi Group employees in Japan, which has remained at 100% for some time. With regard to Group company employees outside Japan, we have begun looking into their status of physical checkups, preparing to implement measures to encourage greater participation.

2. Reduce the number of employees receiving specified health instructions to prevent the deterioration of lifestyle-related diseases to zero.

We have established a system of collaboration between the Company and the health insurance association for employee health enhancement. Concretely, the two parties share employees' health data, which are analyzed to provide personalized instruction for health maintenance and enhancement and effective disease prevention. As part of this system, two sets of policy measures have been drafted to target employees referred to instruction in lifestyle-related diseases following a physical checkup: one for those in a serious condition and the other for those referred to specific health instruction.

3. Reduce presenteeism loss*2.

Shionogi has organized seminars for employees and media organizations on the theme of “presentism loss,” a notion that has come to draw attention in recent years as an indicator of labor productivity. The invited expert speaker (Dr. Kou Matsudaira, the 22nd Century Medical and Research Center of the University of Tokyo Hospital) communicated not only medical knowledge but also shared practical information with the audience, such as simple exercises one can do at work to alleviate lower backache. Through this kind of activity, Shionogi strives to raise health awareness on the part of not only its employees but also society at large.

*2: Presenteeism loss refers to loss attributed to employees who are present at work but are unable to perform as usual or as expected because of their poor mental and/or physical condition.



A seminar scene



Exercise to alleviate lower backache

4. Make all business sites smoke free, aiming to achieve the goal of reducing the employee smoking rate to zero.

At the Head Office and the Shionogi Pharmaceutical Research Center, smoking zones have been entirely removed, already achieving a smoke-free environment on their premises. The other sites and divisions have been continuously working toward the ultimate goal of making all Shionogi workplaces smoke-free by 2020. Their actions include actively encouraging those who wish to quit smoking to seek specified medical attention on an outpatient basis, the purchase of mass-market smoking cessation medications, and promotion of the use of medical clinics for care (management) similar to outpatient care for smoking cessation.

5. Promote efforts to create a comfortable workplace environment that is free from mental health problems.

To realize a workplace environment that does not trigger mental health issues among employees, various measures are implemented: for example, educational and training programs for employees, including those in managerial or supervisory posts; counseling; legally recognized tests to check employees' stress levels; and advice and supervision for employees working long hours. Moreover, support is provided to employees on leave due to mental health issues to assist them in planning their return to work and reconciling therapy with work.

As a result of Shionogi's health management initiatives conducted thus far, in February 2019, the Company was selected for the 2019 list of the "Health & Productivity" stocks and as one of the "Companies with Excellent Health Management (White 500)." The Health & Productivity stocks are jointly selected by the Ministry of Economy, Trade and Industry of Japan and the Tokyo Stock Exchange to recognize TSE-listed companies that are exemplary in their employee health management initiatives undertaken from a strategic, managerial perspective. We were selected for the fourth consecutive year from 2016.



As a company selected for the list of the "Health & Productivity" stocks, Shionogi actively assists other companies in their promotion of health management by, for example, speaking with journalists from specialized magazines and sharing information on Shionogi's health management initiatives with other companies at their request to support their drives for health management.

We believe that health management is effective in not only enhancing employee productivity but also securing quality human resources indispensable for the continuation of drug discovery-based business, and increasingly taking on challenges in the face of the dwindling working-age population in Japan. Shionogi is determined to continue its health management initiatives to be and remain a company that is needed and cherished by its stakeholders for many years to come. All Shionogi employees hope for good health for all people as their personal wish, earnestly engaging in their day-to-day operations and acting out the corporate philosophy to make greater achievements.

10. Site Report

Kuise Site

Energy and resource consumption (amount used)

(FY)

Item	Unit	2014	2015	2016	2017	2018
Electricity	1,000kWh	10,239	9,958	10,359	10,077	10,161
Gasoline	kL	0	0	0	0	0
Kerosene	kL	0	0	0	0	0
Light oil	kL	0	0	0	0	0
Heavy oil A	kL	0	0	0	0	0
Propane gas (LPG)	tons	0	0	0	0	0
Liquefied natural gas (LNG)	tons	0	0	0	0	0
Town gas	1,000m ³	970	986	1,006	1,033	980
Water	1,000m ³	100	89	95	85	82

Impact released (emissions)

(FY)

Item	Unit	2014	2015	2016	2017	2018
CO ₂ emissions	tons-CO ₂	5,238	5,191	5,354	5,331	5,238
Waste generated	tons	237	180	192	207	205
Waste sent to landfill	tons	0.2	0.2	0.0	0.0	0.0
Drainage (sewers)	1,000m ³	77	73	71	63	60
Drainage (public waters)	1,000m ³	0	0	0	0	0
NO _x	tons	0	0	1	0	1
SO _x	tons	—	—	—	—	—
BOD	tons	0	0	0	0	0
COD	tons	—	—	—	—	—

Chemical substances to be registered under the PRTR Act

(kg)

Substance name	Amount handled	Amount released			Amount transferred	
		Air	Public waters	Soil	Outside operating sites	Sewers
N,N-dimethylformamide	2,089	10	0	0	2,078	0
Acetonitrile	8,906	44	0	0	8,862	0
Triethylamine	1,217	12	0	0	1,205	0
Toluene	1,174	6	0	0	1,168	0

Kuise Site



■ Settsu Plant (current Shionogi Pharma Co., Ltd. Settsu Plant)

Energy and resource consumption (amount used)

(FY)

Item	Unit	2014	2015	2016	2017	2018
Electricity	1,000kWh	21,165	20,864	19,549	17,274	14,884
Gasoline	kL	2	1	1	1	1
Kerosene	kL	0	0	0	0	0
Light oil	kL	1	1	1	2	2
Heavy oil A	kL	0	0	0	0	0
Propane gas (LPG)	tons	0	0	0	0	0
Liquefied natural gas (LNG)	tons	0	0	0	0	0
Town gas	1,000m ³	2,933	3,036	2,899	2,781	2,278
Water	1,000m ³	193	173	152	140	140

Impact released (emissions)

(FY)

Item	Unit	2014	2015	2016	2017	2018
CO ₂ emissions	tons-CO ₂	12,919	13,055	12,356	11,413	9,571
Waste generated	tons	373	459	390	276	266
Waste sent to landfill	tons	1.3	1.7	1.0	0.8	0.8
Drainage (sewers)	1,000m ³	190	126	108	98	102
Drainage (public waters)	1,000m ³	0	0	0	0	0
NO _x	tons	2	4	3	3	2
SO _x	tons	—	—	—	—	—
BOD	tons	3	2	1	1	1
COD	tons	3	3	1	1	2

Chemical substances to be registered under the PRTR Act

(kg)

Substance name	Amount handled	Amount released			Amount transferred	
		Air	Public waters	Soil	Outside operating sites	Sewers
Acetonitrile	2,340	0	0	0	2,340	0

Settsu Plant



■ Kanegasaki Plant (current Shionogi Pharma Co., Ltd. Kanegasaki Plant)

Energy and resource consumption (amount used)

(FY)

Item	Unit	2014	2015	2016	2017	2018
Electricity	1,000kWh	28,232	17,115	14,900	13,835	13,745
Gasoline	kL	0	5	5	4	4
Kerosene	kL	0	0	0	0	0
Light oil	kL	0	0	0	0	1
Heavy oil A	kL	989	233	325	48	80
Propane gas (LPG)	tons	14	13	14	13	12
Liquefied natural gas (LNG)	tons	6,361	8,970	8,530	8,067	7,932
Town gas	1,000m ³	0	0	0	0	0
Water	1,000m ³	906	990	938	826	818

Impact released (emissions)

(FY)

Item	Unit	2014	2015	2016	2017	2018
CO ₂ emissions	tons-CO ₂	29,512	30,747	29,055	26,685	26,375
Waste generated	tons	1,920	2,360	2,261	1,881	2,120
Waste sent to landfill	tons	53	98	43	22	21
Drainage (sewers)	1,000m ³	0	0	0	0	0
Drainage (public waters)	1,000m ³	807	829	818	743	740
NO _x	tons	37	20	18	10	12
SO _x	tons	6	1	0	0	0
BOD	tons	2	2	3	1	1
COD	tons	—	—	—	—	—

Chemical substances to be registered under the PRTR Act

(kg)

Substance name	Amount handled	Amount released			Amount transferred	
		Air	Public waters	Soil	Outside operating sites	Sewers
<i>N,N</i> -dimethylformamide	1,705	0	0	0	1,705	0
Acetonitrile	41,054	756	0	0	38,228	0
Dichloromethane (methylene chloride)	97,456	39,981	1	0	37,982	0
Tributylamine	7,885	0	0	0	0	0
Pyridine	17,955	0	0	0	9,687	0
Benzene	711	0	0	0	133	0

Kanegasaki Plant



■ Shionogi Pharmaceutical Research Center

Energy and resource consumption (amount used)

(FY)

Item	Unit	2014	2015	2016	2017	2018
Electricity	1,000kWh	27,577	28,224	28,647	28,594	28,450
Gasoline	kL	0	0	0	0	0
Kerosene	kL	0	0	0	0	0
Light oil	kL	0	0	0	0	0
Heavy oil A	kL	2	1	3	1	2
Propane gas (LPG)	tons	0	0	0	0	0
Liquefied natural gas (LNG)	tons	0	0	0	0	0
Town gas	1,000m ³	2,670	2,522	2,625	2,551	2,402
Water	1,000m ³	149	134	157	164	135

Impact released (emissions)

(FY)

Item	Unit	2014	2015	2016	2017	2018
CO ₂ emissions	tons-CO ₂	14,243	14,099	14,464	14,278	13,903
Waste generated	tons	451	464	466	488	427
Waste sent to landfill	tons	16	15	16	15	13
Drainage (sewers)	1,000m ³	149	134	157	164	135
Drainage (public waters)	1,000m ³	0	0	0	0	0
NO _x	tons	2	2	2	2	2
SO _x	tons	—	—	—	—	—
BOD	tons	3	3	3	2	2
COD	tons	—	—	—	—	—

Chemical substances to be registered under the PRTR Act

(kg)

Substance name	Amount handled	Amount released			Amount transferred	
		Air	Public waters	Soil	Outside operating sites	Sewers
<i>N,N</i> -dimethylformamide	1,247	0	0	0	1,247	0
Acetonitrile	9,448	322	0	0	9,126	0
Chloroform	7,523	284	0	0	7,238	0
Dichloromethane (methylene chloride)	1,688	202	0	0	1,485	0
n-hexane	7,274	417	0	0	6,857	0

Shionogi Pharmaceutical Research Center



■ Aburahi Facilities

Energy and resource consumption (amount used)

(FY)

Item	Unit	2014	2015	2016	2017	2018
Electricity	1,000kWh	2,941	2,340	2,485	2,580	2,518
Gasoline	kL	5	5	5	5	5
Kerosene	kL	7	4	1	2	1
Light oil	kL	0	0	0	0	0
Heavy oil A	kL	32	0	0	0	0
Propane gas (LPG)	tons	326	301	327	333	329
Liquefied natural gas (LNG)	tons	0	0	0	0	0
Town gas	1,000m ³	0	0	0	0	0
Water	1,000m ³	25	16	15	15	15

Impact released (emissions)

(FY)

Item	Unit	2014	2015	2016	2017	2018
CO ₂ emissions	tons-CO ₂	1,973	1,626	1,738	1,786	1,755
Waste generated	tons	167	43	41	48	44
Waste sent to landfill	tons	13	2	1	2	1
Drainage (sewers)	1,000m ³	0	0	0	0	0
Drainage (public waters)	1,000m ³	20	12	8	13	12
NO _x	tons	2	2	2	3	—
SO _x	tons	0	0	0	0	—
BOD	tons	0	0	0	0	0
COD	tons	0	0	0	0	0

Chemical substances to be registered under the PRTR Act
:None

Aburahi Facilities



■ Shionogi Pharma Chemicals Co., Ltd. (current Shionogi Pharma Co., Ltd. Tokushima Plant)

Energy and resource consumption (amount used)

(FY)

Item	Unit	2014	2015	2016	2017	2018
Electricity	1,000kWh	2,895	3,811	4,455	4,521	5,065
Gasoline	kL	0	0	0	0	0
Kerosene	kL	0	0	0	0	0
Light oil	kL	0	0	0	0	0
Heavy oil A	kL	14	0	0	0	0
Propane gas (LPG)	tons	0	0	0	0	0
Liquefied natural gas (LNG)	tons	0	0	0	0	0
Town gas	1,000m ³	254	359	366	401	388
Water	1,000m ³	194	150	172	143	112

Impact released (emissions)

(FY)

Item	Unit	2014	2015	2016	2017	2018
CO ₂ emissions	tons-CO ₂	1,566	2,067	2,292	2,393	2,541
Waste generated	tons	203	261	313	482	692
Waste sent to landfill	tons	0.0	0.6	1.2	0.3	1
Drainage (sewers)	1,000m ³	0	0	0	0	0
Drainage (public waters)	1,000m ³	194	145	172	143	112
NO _x	tons	0	—	—	—	—
SO _x	tons	0	—	—	—	—
BOD	tons	0	1	1	0	0
COD	tons	0	1	0	0	0

Chemical substances to be registered under the PRTR Act

(kg)

Substance name	Amount handled	Amount released			Amount transferred	
		Air	Public waters	Soil	Outside operating sites	Sewers
<i>N,N</i> -dimethylacetamide	4,904	0	0	0	4,904	0
Acetonitrile	37,528	375	0	0	0	0
Dichloromethane (methylene chloride)	21,889	438	0	0	21,451	0

Shionogi Pharma Chemicals Co., Ltd.



■ C&O Pharmaceutical Technology (Holdings) Ltd. Nanjing Plant

Energy and resource consumption (amount used)

(FY)

Item	Unit	2014	2015	2016	2017	2018
Electricity	1,000kWh	8,017	7,044	9,004	7,008	7,636
Coal	tons	242	0	0	0	0
Propane gas (LPG)	tons	449	302	534	462	489
Water	1,000m ³	201	180	236	122	151

Impact released (emissions)

(FY)

Item	Unit	2014	2015	2016	2017	2018
CO ₂ emissions	tons-CO ₂	8,243	6,470	10,012	7,937	8,603
Waste generated	tons	76	53	153	23	25
Waste sent to landfill	tons	0	11	19	2	3
Drainage (sewers)	1,000m ³	—	63	74	31	42
Drainage (public waters)	1,000m ³	—	0	0	0	0

C&O Pharmaceutical Technology (Holdings) Ltd. Nanjing Plant



Greenhouse Gas Emissions and Calculation Methods

In FY 2018, Shionogi commenced the calculation of greenhouse gas (GHG) emissions using calorie conversion factors and CO₂ emission factors for fuels and electricity used each fiscal year. Due to differences in calculation methods and boundary of calculation, the GHG emissions thus calculated differ from the figures presented under “9. Results” in this EHS report. The GHG emissions in or before FY 2017 were retroactively calculated.

GHG emissions in FY2018 marked with ☒ were subject to third-party assurance by KPMG AZSA Sustainability Co., Ltd.

Greenhouse gas (GHG)

Indicators	Unit	2014	2015	2016	2017	2018	
Total of Scope 1, 2 and 3 (Location-based)	tons-CO ₂	282,080	313,354	355,504	287,356	209,171	
(Market-based)	tons-CO ₂	281,383	309,948	349,397	286,898	204,031	
Total of Scope 1 and 2 (Location-based)	tons-CO ₂	102,121	102,125	101,827	90,595	87,850	
(Market-based)	tons-CO ₂	101,424	98,719	95,720	90,136	82,711	
Scope 1	tons-CO ₂	42,876	46,778	46,106	43,456	41,349	<input checked="" type="checkbox"/>
(Intensity of per unit of sales)	tons-CO ₂ /1 million yen	0.1565	0.1509	0.1361	0.1261	0.1137	
Scope 2 (Location-based)	tons-CO ₂	59,245	55,347	55,721	47,139	46,501	<input checked="" type="checkbox"/>
(Intensity of per unit of sales)	tons-CO ₂ /1 million yen	0.2162	0.1786	0.1644	0.1368	0.1278	
Scope 2 (Market-based)	tons-CO ₂	58,549	51,941	49,614	46,681	41,362	<input checked="" type="checkbox"/>
(Intensity of per unit of sales)	tons-CO ₂ /1 million yen	0.2137	0.1676	0.1464	0.1354	0.1137	
Total of Scope 3	tons-CO ₂	179,959	211,229	253,677	196,761	121,321	
Category 3	tons-CO ₂	3,487	3,093	3,015	2,876	2,798	<input checked="" type="checkbox"/>
Other categories	tons-CO ₂	176,472	208,135	250,661	193,885	118,523	

boundary of calculation

Scope 1 and 2: Shionogi Group (excluding overseas related companies [administrative offices]): Shionogi Group companies in Japan and the Nanjing Plant of C&O Pharmaceutical Technology (Holdings) Limited

Scope 3: Shionogi & Co., Ltd.

Calculation methods

Indicators	Calculation methods
Scope 1	CO ₂ emissions resulting from fuel use 【Calculation methods】 Based on the “Greenhouse Gas Emissions Accounting and Reporting Manual (Ver.4.3.2)” of the Ministry of Economy, Trade and Industry and the Ministry of the Environment of Japan 【CO₂ emission factors】 Based on the “Greenhouse Gas Emissions Accounting and Reporting Manual (Ver.4.3.2)” of the Ministry of Economy, Trade and Industry and the Ministry of the Environment of Japan
Scope 2	CO ₂ emissions resulting from purchase of electricity*1 【Calculation methods】 Based on the “Greenhouse Gas Emissions Accounting and Reporting Manual (Ver.4.3.2)” of the Ministry of Economy, Trade and Industry and the Ministry of the Environment of Japan 【CO₂ emission factors】 Based on “Emission Factors by Power Suppliers (for the calculation of GHG emissions by specified emitters) (FY 2017 results)” published by the Ministry of Economy, Trade and Industry and the Ministry of the Environment of Japan (December 27, 2018), and the Emissions Factors (2016) of the International Energy Agency (IEA)
Scope 3 Category 3	CO ₂ emissions resulting from procurement of fuels required for the generation of electricity purchased 【Calculation methods】 Based on the “Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain (Ver.2.5)” of the Ministry of Economy, Trade and Industry and the Ministry of the Environment of Japan, calculate using “7. Emission Unit Values per Use of Electricity and Heat” in the “The Database on Emissions Unit Values for Calculation of Greenhouse Gas Emissions, etc., by Organizations Throughout the Supply Chain (Ver.2.6)” of the Ministry of the Environment of Japan
Other categories	Total of Categories 1, 2, 4, 5, 6, 7 and 12, excluding Categories 8, 9, 10, 11, 13, 14 and 15 that are not included in our own corporate activities or are reported under other categories 【Calculation methods】 Based on the “Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain (Ver.2.5)” of the Ministry of Economy, Trade and Industry and the Ministry of the Environment of Japan

*Scope 2 includes CO₂ emissions resulting from purchase of electricity only. We have not purchased steam, etc.

EHS Management Assessment

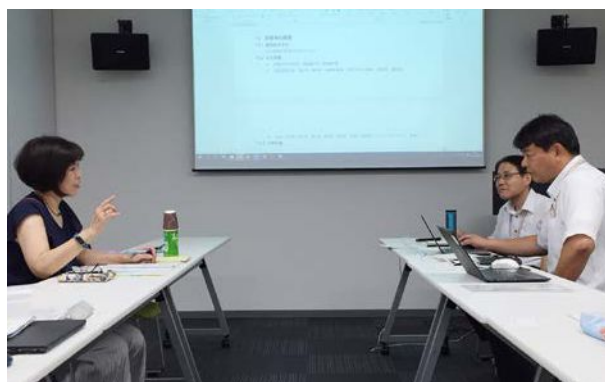
Each year we have the honor of having experts from the Institute for Environmental Management Accounting (IEMA) assess the Shionogi Group's EHS initiatives and management status, to improve the reliability and transparency of the disclosure of our EHS activities and receive advice and feedback on our future activities. For the fiscal year presented in this report, the experts visited us at the Aburahi Facilities, where they interviewed the management team and verified the EHS data.



(L-R) Mikio Kabaki, head of the EHS Office, and Takeshi Ishimure, head of the Corporate Social Responsibility Department, Shionogi; Ms. Eriko Nashioka and Prof. Katsuhiko Kokubu, IEMA; Yoshiaki Kamoya, Senior Executive Officer, Shionogi



Interview with the management team



Audit at Aburahi Facilities

EHS Management Assessment



An outline of the objectives and executed actions

As a third party unrelated to the business operation of Shionogi & Co., Ltd., we have assessed the company's management activities with a focus on the environment, health and safety ("EHS activities") as described in the EHS Report 2019 compiled by the company, and hereby present our views so as to ensure and enhance the reliability of the report.

With regard to Shionogi's EHS activities, notably how they are planned and executed, as well as the performance data resulting from the EHS activities and constituting the basis of the disclosed information, how they are compiled, assessed and utilized, we visited the company's divisions to interview personnel, including Mr. Yoshiaki Kamoya (Senior Executive Officer in charge of EHS affairs), inspect related documents, and held discussions with personnel in charge. At the Aburahi Facilities, we conducted basic verification to confirm that the operations had been conducted in accordance with the designated systems, with regard to the source documents of the disclosed numerical data.

Assessment

The EHS Report is centered on matters relating to the environment, health and safety (EHS), also including the company's business model of value creation, long-term vision, and strategies. In 2018, Shionogi conducted materiality analysis of EHS-related matters, resulting in the identification of material issues. They are extremely important for the Shionogi Group in its environment-related aspect and constitute an integral part of the Group's overall business model and strategies. Since it is important that core matters such as the company's business model of value creation and materiality are clearly reported in two reports, the Integrated Report and the EHS Report, we interviewed Shionogi personnel about the Shionogi Group's overall business model and materiality, among other subjects. This being the company's first year in which it clarifies and discloses information on its business model and materiality, we find some room for improvement in the way the two reports align with each other. While both reports have improved from last fiscal year, it would have been more reader-friendly if a clearer positioning of each report had been presented. Another point for future improvement would be an enhanced disclosure of non-financial information other than EHS information, such as Shionogi's medical assistance and social support for patients and healthcare professionals in Kenya.

With regard to EHS information, it is disclosed in the EHS Report, basically in accordance with the guidelines for environmental reports of the Ministry of the Environment. The current EHS Report is seen as a major step forward from the previous year's report mainly for the description of the positioning of various elements within the business model and the long-term vision, as well as the identification of important challenges through materiality analysis. We now understand that, contemplating the whole situation more extensively, climate change does pose serious challenges even to a pharmaceutical company, which is in a low-carbon sector, such as the emergence and expansion of infectious diseases. This and combatting AMR represent areas where society has great expectations of the Shionogi Group, as it attempts to solve society's problems in a way that only Shionogi can. In the future, we look forward to the development of indicators of progress and achievement on these themes.

<Aburahi Facilities>

We visited the Aburahi Facilities, Shionogi's historic operating site opened in 1945. This is a vast site of 36.5 ha encompassing laboratories, botanical gardens, and an orchard in a rich natural environment. The botanical gardens, which Shionogi has owned since the first years of the Aburahi Facilities, are of high scientific value, with about 1,300 precious species of plants, including some 57 endangered species, cared for and managed in an orderly manner. The botanical gardens play an important role in the protection of biodiversity. Access is limited to experts due to the characteristics of the plants growing there, and opening to the general public would be difficult. However, at the visitors' center of the Aburahi Facilities, it is possible to view ancient documents about plants and other precious artifacts. This is a place that you must visit if you wish to know Shionogi's history. You can appreciate the value the Shionogi Group has created in society over many years and what it is striving to transmit to future generations. We expect to see a more active use of, and dissemination of information from, the Aburahi Facilities defined as a place symbolizing the Shionogi Group's corporate value.

The Aburahi Facilities house a rich natural environment, where the control of environmental load from waste water and materials and the like are under the same management system as at other sites. We found that it was strictly managed, probably because laboratory animals are kept there. The site completed a switch of fuel from heavy oil to LPG on the occasion of the building renovation, with all environmental protection measures put in place and implemented. We were told that future effort will mainly focus on personnel awareness raising at the individual level and review of measures from new angles. We strongly felt that handing down tradition to future generations is also an important social mission for a corporation.

September 12, 2019

Institute for Environmental Management Accounting (IEMA)

Katsuhiko Kokubu (Professor, Kobe University/Director of IEMA)

Eriko Nashioka (Representative Director of IEMA/certified public accountant, licensed tax accountant)


Independent Assurance Report

The data on greenhouse gas emissions on Page 54 have been assured by KPMG AZSA Sustainability Co., Ltd. to enhance their reliability.



Independent Assurance Report

To the President and CEO of Shionogi & Co., Ltd.

We were engaged by Shionogi & Co., Ltd. (the “Company”) to undertake a limited assurance engagement of the environmental performance indicators marked with “” (the “Indicators”) for the period from April 1, 2018 to March 31, 2019 included in its EHS Report 2019 (the “Report”) for the fiscal year ended March 31, 2019.

The Company’s Responsibility

The Company is responsible for the preparation of the Indicators in accordance with its own reporting criteria (the “Company’s reporting criteria”), as described in the Report.

Our Responsibility

Our responsibility is to express a limited assurance conclusion on the Indicators based on the procedures we have performed. We conducted our engagement in accordance with the ‘International Standard on Assurance Engagements (ISAE) 3000, Assurance Engagements other than Audits or Reviews of Historical Financial Information’ and the ‘ISAE 3410, Assurance Engagements on Greenhouse Gas Statements’ issued by the International Auditing and Assurance Standards Board. The limited assurance engagement consisted of making inquiries, primarily of persons responsible for the preparation of information presented in the Report, and applying analytical and other procedures, and the procedures performed vary in nature from, and are less in extent than for, a reasonable assurance engagement. The level of assurance provided is thus not as high as that provided by a reasonable assurance engagement. Our assurance procedures included:

- Interviewing the Company’s responsible personnel to obtain an understanding of its policy for preparing the Report and reviewing the Company’s reporting criteria.
- Inquiring about the design of the systems and methods used to collect and process the Indicators.
- Performing analytical procedures on the Indicators.
- Examining, on a test basis, evidence supporting the generation, aggregation and reporting of the Indicators in conformity with the Company’s reporting criteria, and recalculating the Indicators.
- Visiting one of the Company’s subsidiaries selected on the basis of a risk analysis.
- Evaluating the overall presentation of the Indicators.

Conclusion

Based on the procedures performed, as described above, nothing has come to our attention that causes us to believe that the Indicators in the Report are not prepared, in all material respects, in accordance with the Company’s reporting criteria as described in the Report.

Our Independence and Quality Control

We have complied with the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior. In accordance with International Standard on Quality Control 1, we maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

KPMG AZSA Sustainability Co., Ltd.

KPMG AZSA Sustainability Co., Ltd.

Osaka, Japan

December 16, 2019

