Environment Report 2018

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Contents, Abbreviation list

Abbreviation list

Abbreviation	Explanation
GHG	Greenhouse gases. There are seven categories of greenhouse gases: carbon dioxide, methane, nitrous oxide, hydro fluorocarbons, per fluorocarbons, sulfur hexafluoride and nitrogen trifluoride. At Astellas, non-energy source CO_2 was discharged from waste fluids from our incinerators before, but only energy-source CO_2 is emitted now. In this report, GHG is used for all types of gas.
CO_2	Abbreviation for carbon dioxide.
Scope 1	Volume of GHGs emitted directly from Company premises as a result of the burning of fuels (city gas, fuel oil, kerosene, diesel oil, gasoline, LPG, LNG)
Scope 2	Volume of GHGs emitted indirectly in the use of electric power or heat supplied to the Company from outside
Scope 3	GHGs emitted indirectly at some point on the Company's value chain (production, transportation, business trips, commuting, etc.)
SOx	Sulfur oxides-emitted by the burning of fossil fuels containing sulfur
NOx	Nitrogen oxides-formed through the combination of nitrogen and oxygen in the atmosphere during the combustion of substances
BOD	Biochemical oxygen demand. Used as a benchmark for indicating extent of water pollution by organic matter in rivers.
COD	Chemical oxygen demand-indicates the amount of water pollution due to the presence of organic compounds in seas or lakes
VOC	Volatile organic compounds-organic chemical compounds that are volatile in the atmosphere at standard ambient temperatures and pressures
EHS	Abbreviation for "Environment and, Health & Safety"

Corporate Data, Editorial Policy

■ Corporate Data

Company Name	Astellas Pharma Inc.
Headquarters	2-5-1, Nihonbashi-Honcho, Chuo-ku, Tokyo 103-8411, Japan
Capital	¥103,001 million (as of March 31,2018)
Representative Director	Kenji Yasukawa (President and CEO)
Foundation	1923
Net Sales	¥1,300,316 million (consolidated basis, as of March 31, 2018)
Employees	16,660 (consolidated basis, as of March 31, 2018)
Professional institution affiliation	・Japan Business Federation ・The Federation of Pharmaceutical Manufacturers' Associations of Japan ・Japan Pharmaceutical Manufacturers association, etc.

■ Reporting Period

As a general rule, this Report covers the activities of facilities in Japan from April 1, 2017 to March 31, 2018, and the activities of overseas facilities from January 1, 2017 to December 31, 2017. (Certain sections of this Report contain details of activities and initiatives both prior to and after these identified reporting periods.)

■ Reporting Coverage

This report covers the following companies, including head office functions, plants, research functions, and sales affiliates. Moreover, the report also covers the activities of Astellas subsidiaries that are included in these companies.

Japan
- ●Astellas Pharma Inc.
- ●Astellas Pharma Tech Co., Ltd.

Americas
- ●Astellas US LLC
- ●Agensys, Inc.
- ●Astellas Research Institute of America LLC
- ●Astellas Institute for Regenerative Medicine
- ●Various sales affiliates

EMEA
- ●Astellas Pharma Europe Ltd.
- ●Astellas Pharma Europe B.V.
- ●Astellas Ireland Co., Limited
- ●Various sales affiliates

Asia/Oceania
- ●Astellas Pharma China, Inc.
- ●Various sales affiliates

In addition, certain environmental data includes the results of activities of subcontractors because the environment and society is affected not only by the Company's own activities but also via the value chain

■ Editorial Policy

In publishing this "Environmental Report," Astellas has worked to provide a more detailed account of its activities in an easy-to-understand manner to all those who are affected by its environmental initiatives and the various stakeholders. The environment is one of the CSR fields in which Astellas actively tackles issues, sets targets, and undertakes initiatives. When preparing this Report, every effort was made to include easy-to-understand explanations using specific examples, numerical data, and graphs and charts.

An overall picture of CSR-based management at Astellas and activities in the five fields of compliance, employees, the economy, society, and the environment is contained in the Annual Report, a printed publication that is scheduled for release in August. Accordingly, excerpts from the Environment Report can be found in the Environment Section of the Annual Report.

■ Important Changes in Organization during the Reporting Period

There are no changes that should be reported.

■ Guidelines

The Environmental Reporting Guidelines (2012 edition) issued by Japan's Ministry of the Environment.

■ Notational System of Numerical Results

Total and tallies of shares may not always match due to the effect of rounding.

■ Information regarding Publication

Date of issue: June 2018
Next scheduled issue: June 2019

There is no printed version of the Environment Report.

(English version edited: July 4th, Japanese original version issued on June 13th, 2018)

Environmental Initiatives

Astellas believes that maintaining a healthy global environment is an essential theme for building a sustainable society, and is also an important element in maintaining sound business activities. In order for Astellas to achieve sustainable growth, Astellas must fulfill its corporate social responsibilities regarding issues that impact on the local environment, including climate change problems, environmental pollution, and waste disposal.

the Company recognizes the critical importance of fulfilling its corporate responsibilities toward society with the understanding that any failure to do so will lead to a deterioration of its standing in society and ultimately corporate value. Because of the inherent risk that expenditure will directly impact the Company's operations, consideration must also be given to increases in energy and raw material costs reflecting the sharp rise in resource prices, as well as expenses incurred in responding to new environment-related regulations including taxes. Accounting for each of the aforementioned, positive steps toward the effective use of energy and resources will not only reduce environmental load, but also bolster business operations.

Going forward, Astellas will formulate its vision for being a responsible corporation based on a long-term global perspective that keeps future generations in mind. At the same time, we will continue efforts to address regional social issues and pursue corporate activities in harmony with the global environment.

■ Main Environmental Targets Achieved in Fiscal 2017(Summary)

Environmental Action Plan Numerical Targets	Fiscal 2017 Performance
1. Measures to Address Climate Change (Global) [fiscal 2005 as the base year] Reduce GHG emissions by 35% or more compared with fiscal 22005 levels by fiscal 2020 ・ Japan : Reduce by 30% or more ・ Overseas production facilities : Reduce by 45% or more	Ratio to fiscal 2005 level : -30% Japan : -29% Overseas : -37%
2. Resource Management (Global) [fiscal 2005 as the base year] Enhance water resource productivity by around 2.5 times the fiscal 2005 result by the end of fiscal 2020 Applicable areas: Research and production sites in Japan and overseas Indicator: **Sales (Bill. Yen)/Volume of water resource withdrawn (1000m^3)**	Ratio to fiscal 2005 level : 2.9 times
3. Waste Management (Global) [fiscal 2005 as the base year] Improve waste generated per unit of sales to approx. 20% of fiscal 2005 by the end of fiscal 2020. Applicable areas: Research and production sites in Japan and overseas Indicator: **Volume of waste generated (tons)/Sales (Billion Yen)**	Ratio to fiscal 2005 level : 21%
4. Biodiversity (Global) [fiscal 2005 as the base year] Triple the biodiversity index from the fiscal 2005 level by fiscal 2020	Ratio to fiscal 2005 level : 2.6 times

■ Environment Management

Astellas' basic stance toward the environment as well as the health and safety of its employees is outlined under the Astellas Environment, Health & Safety Policy. Moreover, Astellas is working organizationally and continuously toward achieving this stance as described in the Astellas Environment, Health & Safety Guidelines. Our Environmental Action Plan sets out medium-term targets for our activities regarding the key points.

■ Astellas EHS Guidelines

The Astellas Environment, Health & Safety Guidelines provide unified standards to be upheld in our implementation of environmental and safety measures. These guidelines indicate the stance Astellas should aim for in the future.

In fiscal 2016, we revised the contents of the guidelines based on the results of our initiatives to date, and added the "Supply Chain Management" section. The guidelines qualitatively describe our aims, and concrete numerical targets, including their deadlines, will be stipulated through short- and medium-term action plans that will be updated every fiscal year.

Environment Management

TOP Message

In order to achieve sustainable growth, Astellas is engaged in implementing measures from a long-term perspective regarding issues created by environmental factors, including climate change issues, the effective use of resources, and the prevention of pollution. These environmental preservation activities are conducted in various parts of the world in line with the Astellas Environment, Health & Safety Policy that Astellas is aiming to achieve, and in line with the Astellas Environment, Health & Safety Guidelines. Astellas not only complies with various environmental laws and regulations but also voluntarily sets even higher targets and strives in good faith to reduce its environmental burden.

As the value chain continues to expand in line with the global expansion of Astellas' businesses, the expectations for Astellas to contribute to the sustainable development of society are also changing. In particular, implementing initiatives to counter climate change are one of the social responsibilities of Astellas, which conducts business activities worldwide. Moreover, Astellas must properly present these initiatives and their implementation to its stakeholders. Therefore, in order to implement initiatives to address climate change issues throughout the value chain, Astellas has adopted Science Based Targets ("SBT") with the goal of reducing greenhouse gas emissions based on scientific grounds, and since April 2018 has been promoting a new action plan based on SBT.

Looking ahead, Astellas is committed to continuing to promote business activities in harmony with the natural environment, and to continuing to meet the expectations of its stakeholders and society.

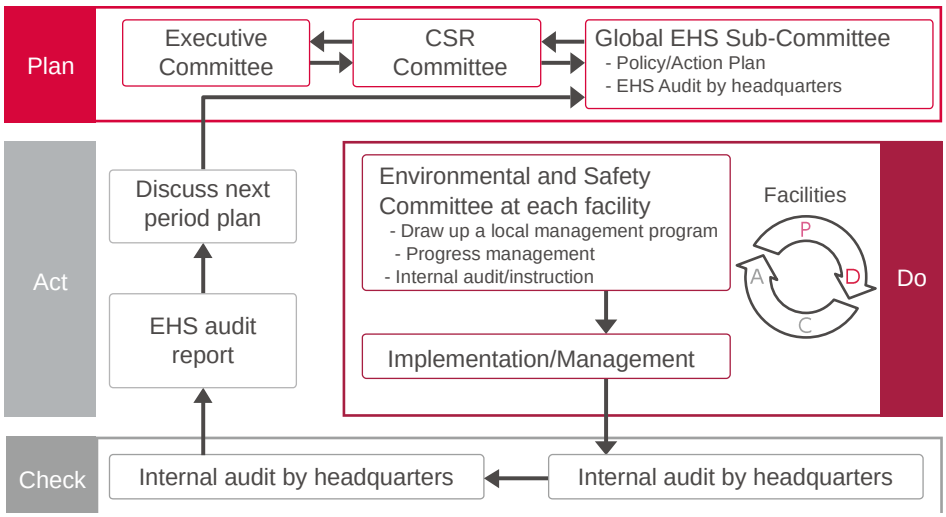
Chief Administrative Officer
and Chief Ethics & Compliance Officer
Fumiaki Sakurai

■ EHS Management System

Fundamental policies and action plans relating to EHS matters are positioned as an important issue in CSR management, and are discussed and determined by the CSR Committee. (The committee is chaired by the Chief Administrative Officer & Chief Ethics & Compliance Officer.) Measures for implementing these decisions in specific form are then examined by the Global EHS Sub-committee, which is a subordinate organization under the CSR Committee. Moreover, the CAO & CECO directly receives reports regarding risk management related to EHS, and issues any necessary instructions. In addition, cases such as investment in Climate Change Mitigation Measures and risk response related to EHS are discussed and decisions are made by the Executive Committee* or a meeting of the Board of Directors.

Astellas has acquired ISO14001 certification covering all production sites in Japan and outside Japan.

*) An advisory body that discusses important matters related to management of the entire Astellas Group, and makes decisions.



■ EHS Audit

An audit team led by the officer in charge of CSR has been organized and conducts a company-wide EHS audit every fiscal year, in line with the Astellas EHS Guidelines, in order to evaluate the progress of EHS activities throughout Astellas Group. The audit sets items to be audited according to the Astellas EHS Guideline and evaluates their level of conformity to the Guideline. It also identifies issues to be resolved and promotes efforts for continuous improvement EHS Audits

■ EHS Assessment System

The total environmental load resulting from the production, sale, distribution and disposal of products can usually be approximated at the research and development stages. With regard to the production and sales of pharmaceutical products, it is necessary to obtain government approval for each product. Since government approval also covers production methods and packaging specifications, when there are changes in either approved production methods or packaging, new approval must be obtained even if the changes are related to work safety or reducing the environmental impact. This entails substantial time and costs. Therefore, Astellas has introduced an EHS assessment system as a tool that requires efforts to minimize the environmental load at all stages, including research and development, production, distribution, and disposal.

Under this assessment system, we examine issues such as the reduction of air pollutant emissions and the excessive use of packaging and various safety measures prior to the commencement of commercial-scale production, including development based on the concept of green chemistry.

■ Operation of the EHS Assessment System

An assessment team conducts EHS assessments in stages for the development of products. The results determine whether development of the product can move on to the next stage. Specifically, the assessment must identify raw materials or processes that might have a negative impact on the environment and/or employee health and safety. The progress on remedial measures must be assessed, and action plans evaluated. Countermeasures being considered are evaluated in the subsequent stages of the assessment.

■Education and Training

In order to promote further improvements in its EHS activities, the Company acknowledges the critical need to ensure that all employees have a correct understanding of their own roles and responsibilities. To this end, we are working to develop employees professionally qualified in EHS matters and improve our skill base through a wide variety of training programs, including specialized education for employees engaged in roles requiring specialist knowledge and skills in areas such as environmental conservation or hazardous operations. We also explain our policies and site rules to construction workers at our plants, raw materials suppliers and waste disposal contractors, and request cooperation with our EHS activities.

■Response to Accidents and Emergencies

Being prepared for emergency situations caused by an accident or natural disaster can help to prevent an environmental catastrophe and minimize damage. Accordingly, we have developed specific measures and procedures. Moreover, we conduct regular education sessions and training drills, and reconfirm and test the validity of our procedures, communication networks and the division of roles focusing on risks that are recognized as a high priority. In this manner, we continue to work diligently to reduce environmental risk.

In particular, the discharge of harmful substances could lead to the pollution of rivers and seas as well as cause problems at sewage treatment plants. This in turn could have a grave impact on regional communities. In preparation for accidents and emergency situations, we are therefore systematically implementing measures for the prevention of environmental pollution, including the installation of backup equipment, while working to reduce the risk of pollution. In addition, we are bolstering efforts to monitor operations and to measure the quality of water draining out of our plants to confirm compliance with relevant effluent standards.

■ Compliance with Environmental Laws and Regulations

Over the past five years, there were no infractions of laws or regulations, and no lawsuits, related to environmental issues that were identified at our business sites in Japan or overseas.

However, there was an occurrence in which a noise exceeded the upper limit of the noise agreement values agreed with the local government at the Tsukuba Biotechnology Research Center. We are proceeding with making improvements and confirming matters with the local government.

■ Environment-Related Accidents and Complaints

In fiscal 2017, there were no environment-related accidents in Japan. In fiscal 2015, there was an accident in which the pressure in the reaction vessel became higher than normal, and a part of the gas being generated was released into the atmosphere, in the pharmaceutical manufacturing process at the Takahagi Facilities. Because exhaust gas falls under the scope of the specific substances of the Air Pollution Control Law, we submitted an accident report, including the measures taken to prevent recurrence. Except for this accident, Astellas has not recorded an environment-related accident in Japan over the past five years.

We received no environmental-related complaints associated with facilities operations.

■Soil Contamination Assessments

In fiscal 2016, we conducted a soil contamination survey at the closed Kashima R&D Center, and reported to the city of Osaka that soil contamination had been discovered. Based on these reported results, in April 2017 the plant was designated as a contaminated area on the basis of the Soil Contamination Countermeasures Act. Astellas will demolish the center and take other appropriate action in consultation with the governmental authorities.

The substances that were discovered to be present in levels that exceeded the standards are as follows:

- Trichloroethylene
- Benzene
- Hexavalent chromium compound
- Mercury and its compounds
- Selenium and its compounds
- Lead and its compounds
- Arsenic and its compounds
- Fluorine and its compounds

Drawing on the results of soil contamination assessments completed over the past five years, no instances of contamination were detected other than the case mentioned above.

Interaction between Astellas and the Environment

INPUT			
Energy	Electricity	260,783	MWh
	(Renewable sourced	29,447	MWh)
	City gas	23,167	thousand m^3
	(Renewable sourced	146	thousand m^3)
	LPG	1,688	tons
	LNG	2,362	tons
	Kerosene	0	kiloliters
	Diesel oil	2,408	kiloliters
	Gasoline	7,836	kiloliters
	Purchased heat (hot/cold water)	4,884	GJ
	Purchased heat (steam)	20,342	GJ
	Other renewable energy	46,775	GJ
Resource	Water	8,821	thousand m^3
	Raw materials (by weight)*1	4,857	tons
	Raw materials (by volume)*1	890	kiloliters
	Copier paper *1	179	tons

OUTPUT			
GHGs	Scope 1	87,429	tons
	(Sales fleets	24,203	tons)
	Scope 2	119,499	tons
Pollutants (atmosphere)	NOx	26	tons
	VOC *2	34	tons
Pollutants (water bodies)	BOD	11	tons
	COD	26	tons
Discharge *3	Water discharge	7,608	thousand m^3
Waste material	Waste generated	13,964	tons
	Landfill volume *4	143	tons

*1 all business premises
*2 all production facilities and R&D sites in Japan
*3 volume of water discharge from non-Japanese production facilities was equivalent to withdrawal amount
*4 all Japanese facilities excluded sales branches

Indirect GHGs (Scope3)

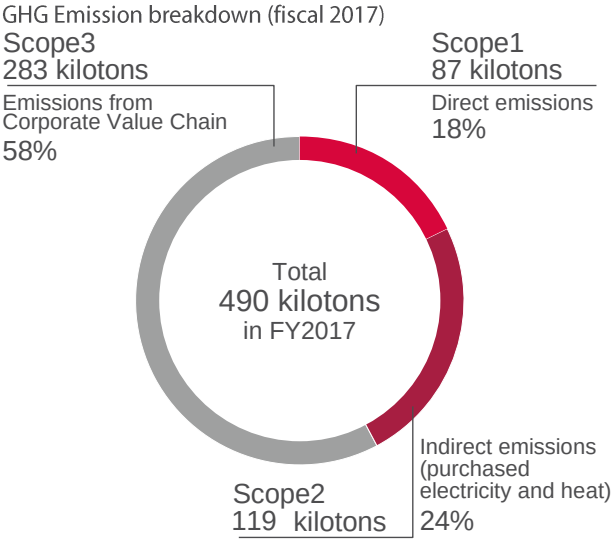
Upstream Scope3 emissions		
1	Purchased goods and services	144,418 tons
2	Capital goods	68,203 tons
3	Fuel and energy related activities (not included in Scope 1 and Scope 2)	26,002 tons
4	Transportation and distribution (upstream)	3,781 tons
	Truck transportation of raw materials	(244 tons)
	Plant → warehouse	(286 tons)
	Warehouse	(853 tons)
	Warehouse → wholesalers	(2,398 tons)
5	Waste generated in operation	4,753 tons
6	Business travel (by airplane)	32,572 tons
7	Employee commuting	2,542 tons
8	Leased assets (upstream)	Not relevant
Downstream Scope3 emissions		
9	Transportation and distribution (Downstream)	Not relevant
10	Processing of sold products	Not relevant
11	Use of sold products	No emissions' results
12	End-of-life treatment of sold products	668 tons
13	Leased assets (Downstream)	Not relevant
14	Franchises	Not relevant
15	Investments	Not relevant

Remark: The calculation method for Scope3 emissions is mentioned on page 19.

GHG Emissions Throughout the Value Chain

GHG emissions associated with Astellas' business activities amounted to 490 kilotons globally. Astellas is monitoring the greenhouse gas emissions associated with the use of almost all its facilities and sales fleets. In addition to Scope 1 and Scope 2 emissions, Astellas continues working to monitor Scope 3 emissions.

GHG Emission breakdown (fiscal 2017)



Environmental Action Plan

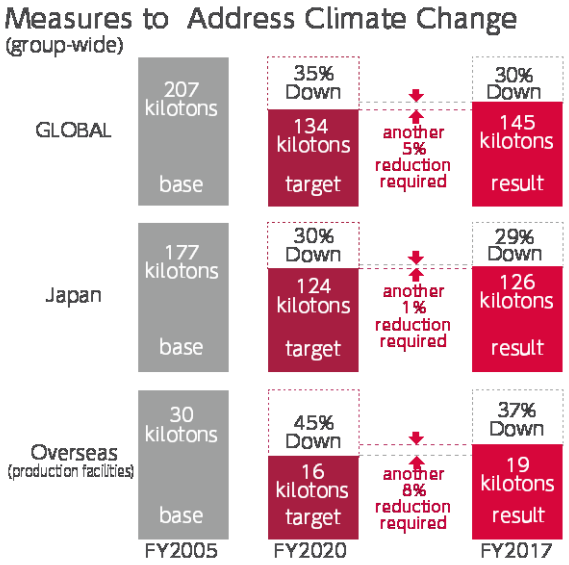
■Environmental Action Plan

Our Environmental Action Plan sets out medium-term targets for our activities regarding the key points of the Astellas Environment, Health & Safety Guidelines. We renew our action plans on a rolling basis, by reviewing progress and conditions during the previous year and incorporating our findings into our action plan for the following year. We are always working to achieve the targets set out in our Environmental Action Plan, which are also reflected in individual action plans.

Currently, the activities of all the production facilities of the Astellas group worldwide and non-production sites in Japan fall within the scope of the Environmental Action Plan. At the same time, the activities of overseas R&D centers, offices, and other bases of operation continue to increase in line with the Group's efforts to further expand and develop its business globally. As a result, we are keeping track of the performance of overseas facilities and bases that fall outside the scope of the Environmental Action Plan, focusing particularly on energy consumption.

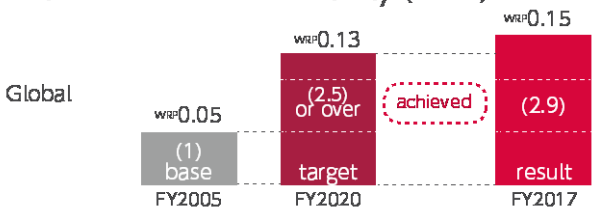
The results of the Environmental Action Plan for fiscal 2017 are below. To evaluate the Environmental Action Plan, we have used a coefficient of 0.330 kg-CO_2/kWh to calculate CO_2 from electricity use in Japan in fiscal 2017. Please note that these figures differ from those used in calculations of actual emissions.

Measures to Address Climate Change



The percentage figures are rates of reduction compared to the base year

Water Resource Productivity (WRP)

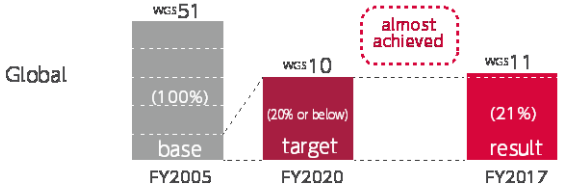


$$\text{Water Resource Productivity (WRP)} = \frac{\text{Sales (billion YEN)}}{\text{Volume of water resource used (1000 m}^3\text{)}}$$

Biodiversity

Biodiversity Index: Index came in at 2.6 compared to base year (FY2005)

Waste Generated per unit of Sales (WGS)



$$\text{Waste Generated per unit of Sales (WGS)} = \frac{\text{Volume of waste generated (tons)}}{\text{Sales (billion YEN)}}$$

■ Review of the Environmental Action Plan (Climate Change Mitigation Measures)

The current Environmental Action Plan has a base year of fiscal 2005, so we have decided to revise this Environmental Action Plan because the internal and external environments have greatly changed since that time.

Main Changes:

- Increase in overseas offices
- In Japan's electricity usage, there is a divergence between the volume of GHG emissions based on the Environmental Action Plan and the volume of actual emissions
- Transfer of Fuji Plant, Norman Plant, etc. to other companies, etc.

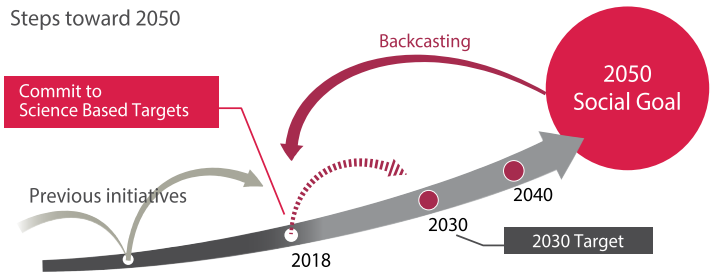
In the new Environmental Action Plan, we have newly set In the new Environmental Action Plan, we have newly set our targets that are consistent with the Science Based Targets ("SBT"), which recommended that private companies set reduction targets aligned with the Paris Agreement, which entered into force in 2016, with all business activities being evaluated. In February 2018, we submitted a commitment letter to the SBT Initiative. We expect that our fiscal 2030 targets (base year: fiscal 2015) will be verified and approved by the SBT Initiative by the end of fiscal 2018.

Climate Change Mitigation Measures

Mitigating and adapting to the threat posed by climate change requires active involvement on all levels including national governments, local governments, corporations and citizens. Astellas recognizes that climate change will become a constraint on conducting sustained corporate activity, and considers it one of management's most important problems to address.

To achieve the 2°C target of the Paris Agreement, Astellas adopted the recommended method for setting reduction targets and formulated a new Environmental Action Plan in light of the national and corporate promotion of international initiatives such as the Science Based Targets ("SBT;" reduction targets consistent with scientific knowledge).

We will also focus on the risks and opportunities that climate change will present to our business, and promote our efforts from a medium- to long-term perspective.



Environmental Action Plan (Climate Change Mitigation Measures)

■ **Reduce GHG emissions (Scope 1 + Scope 2) by 30% by fiscal 2030 (Base year: fiscal 2015)**

■ Changes in Actual GHG emissions

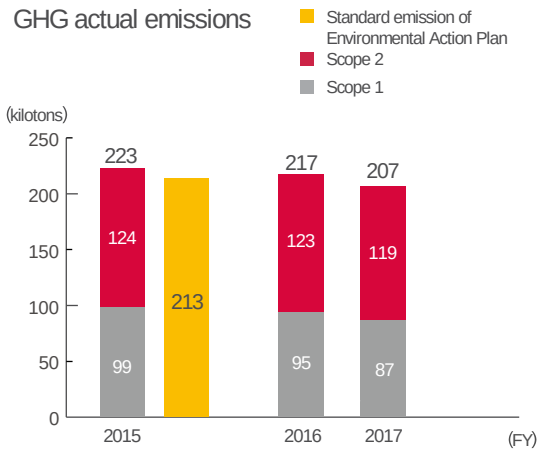
The actual volume of GHG emissions of Astellas in fiscal 2017 was 207 kilotons (Scope 1: 87 kilotons, Scope 2: 119 kilotons).

■ Toward the Reduction of Scope 2 emissions

In order to reduce the indirect emissions associated with externally supplied energy, Astellas employs a "market-based method" that uses emission coefficients for each electricity company from which Astellas actually receives a supply.

Emissions in regions where it is difficult to use the emission coefficients for each electric power company are calculated with country-specific emissions coefficients provided in the CO_2 EMISSIONS FROM FUEL COMBUSTION 2017 EDITION published by the International Energy Agency.

Moreover, we are purchasing electricity generated by renewable energy sources at plants and other facilities in Europe.



Changes in GHG Emissions Volume by Area **(Unit: tons)**

	Fiscal 2015	Ratio (%)	Fiscal 2016	Ratio (%)	Fiscal 2017	Ratio (%)
Japan	**166,857**	75	**166,644**	77	**162,680**	79
Scope1	61,036		61,160		60,804	
Scope2	105,821		104,484		101,875	
Americas	**31,837**	14	**26,702**	12	**23,668**	11
Scope1	21,329		15,996		12,805	
Scope2	10,508		10,707		10,863	
EMEA	**19,969**	9	**19,913**	9	**16,759**	8
Scope1	16,093		16,368		13,803	
Scope2	3,877		3,545		2,955	
Asia/Oceania	**4,080**	2	**3,861**	2	**3,823**	2
Scope1	41		23		17	
Scope2	4,039		3,837		3,807	
Total	**222,744**		**217,120**		**206,929**	
Scope1	98,500	-	94,547	-	87,429	-
Scope2	124,244		122,573		119,500	

Our Efforts to Reduce GHG Emissions

In order to reduce GHG emissions, Astellas must implement initiatives across the entire Group from a medium-term perspective. Based on an understanding of regional differences of customs and practices, Astellas' manufacturing plants, research centers, sales and marketing divisions, and offices are implementing a variety of initiatives with the aim of mitigating climate change. Regarding tangible elements, efforts to improve facilities, which include the introduction of high-efficiency equipment and the conversion to alternative fuels, are expected to make a significant contribution to reducing the level of GHG emissions generated by energy sources. Regarding intangible aspects, employees' participation in energy saving through improvements of daily work is also important. To this end, each facility adopts a two-pronged approach, comprising measures related to both tangible and intangible elements.

■ Promotion Framework and Initiatives for Climate Change Mitigation Measures

Astellas has established the Global EHS Sub-Committee as a special task force under the CSR Committee to discuss measures to deal with various environmental issues, including climate change mitigation measures. Members from regional bases participate in discussions on methods to save energy and reduce GHG emissions throughout the Group based on an analysis of the risks and opportunities that climate change presents to our business, and so forth. Matters discussed and decided by the Global EHS Sub-Committee will be reported to top management in the CSR Committee.

■ Analysis of the Risks and Opportunities That Climate Change Presents to Our Business

We carry out scenario analysis regarding changes in the external environment due to such factors as international policy trends and emissions trading systems, the impact on work operations of physical changes caused by climate change, and assessments by stakeholders concerning our measures to mitigate and adapt to climate change. We believe that understanding the conceivable risks and moving forward with medium- to long-term measures to minimize risk will lead to opportunities for our business to be sustainable.

■ Investment Plan for Climate Change Mitigation Measures

In fiscal 2017, Astellas planned to invest approximately ¥450 million in mainly energy-saving measures at each business facility, the renewal of air conditioning equipment, and the introduction of LED lighting. In fact, we completed an investment of ¥180 million and reduced GHG emissions by 2,061 tons. Regarding the feasibility study of installing a biomass boiler conducted in fiscal 2016, we will continue to investigate its installation despite issues such as cost-effectiveness.

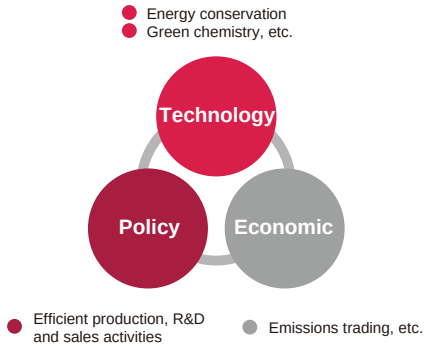
■ Participation in the Federation of Economic Organizations' Commitment to a Low-Carbon Society

Astellas is participating in the commitment to a low-carbon society* formulated by the Federation of Pharmaceutical Manufacturers' Associations of Japan, which is based on requests from the Federation of Economic Organizations.

*To reduce the amount of carbon dioxide emissions from pharmaceutical manufacturers in fiscal 2020 by 23% based on the amount of emissions in fiscal 2005.

■ Understanding GHG Emissions in the Value Chain

Although the Environmental Action Plan concerning climate change is targeting emissions directly generated by business activities (Scope 1 and Scope 2), Astellas is also striving to assess emissions produced throughout the entire value chain (Scope 3). We have also set SBTs for GHG emissions from major categories within Scope 3, and are striving to reduce them.



■ Priority Use of Gaseous Fuel

At Astellas' research and production bases, we use boilers fueled by city gas, LPG and LNG (liquefied natural gas), all of which generate low GHG emissions during combustion. These boilers not only contribute to reducing GHG emissions but also to reducing SOx emissions, another air pollutant.

■ Introduction of Energy Monitoring Systems

Knowing exactly how much energy we use is useful for the formulation of new strategies. We have introduced energy monitoring systems that can visually monitor energy usage at our facilities.

■ Reduction of GHG Emissions Generated by Sales Activities

Since fiscal 2008, Astellas has been striving to reduce GHG emissions associated with the use of sales fleets. In each region, we are continuously switching over to vehicles with low environmental impact (e.g. hybrid cars). In Japan, where the rate of introducing hybrid vehicles is high, the volume of GHG emissions relative to the number of vehicles has been reduced more than in other regions.

GHG emissions associated with the use of sales fleets are reported under Scope 1.

Changes in GHG Emissions by Sales Activities (tons)

	Fiscal 2015	Fiscal 2016	Fiscal 2017
Total for each region	**28,725**	**27,287**	**24,203**
Japan	5,276	4,733	4,316
Americas	12,199	10,782	10,760
EMEA	11,250	11,772	9,127

When it is not possible to grasp the actual fuel usage, it is estimated from mileage and fuel efficiency (catalog value).

■ Using Renewable Energy

The use of renewable energy is one of the most effective climate change countermeasures. Astellas is proactively introducing photovoltaic panels and wind power, and such equipment as biomass boilers, to its facilities. All energy generated through these means is consumed at these facilities.

Moreover, we purchase carbon-neutral city gas and electricity generated by renewable energy sources. As a result, we are indirectly suppressing GHG emissions.

Usage of Renewable Energy (Fiscal 2017)

Offices	Type of renewable energy	Energy consumed
Kerry Plant	Wind turbine generation (Power capacity 800 kW)	1,692 MWh
	Wood chip biomass boiler (Power capacity 1.8 MW)	37,211 GJ
	Purchase of electricity generated by renewable energy sources	6,650 MWh
Dublin Plant	Purchase of electricity generated by renewable energy sources	5,855 MWh
Meppel Plant	Purchase of electricity generated by renewable energy sources	12,896 MWh
Leiden	Purchase of electricity generated by renewable energy sources	2,305 MWh
	Purchase of carbon neutral city gas	146 thousand m^3
	Use of geothermal heat	1,491 GJ
US HQs	Use of geothermal heat	3 GJ
Tsukuba Research Center	Photovoltaics	49 MWh
Yaizu Facilities	Use of geothermal heat (cannot be measured)	-

■ Breakdown of Energy Consumption

Global energy usage in fiscal 2017 by the Astellas Group amounted to 4,282 terajoules (TJ), for a decrease of 5.2% (236TJ) over the previous year. The percentage of total energy consumption accounted for by electricity is high because in each region a large amount of electricity is consumed by the operating of air conditioning. Astellas strives to reduce its energy consumption, including through the continued implementation of energy-saving measures and the introduction of highly efficient equipment.

Japan (Unit: TJ)

	Fiscal 2015	(%)	Fiscal 2016	(%)	Fiscal 2017	(%)
Liquid fuel	**80**	3	**72**	2	**65**	2
Gaseous fuel	**1,098**	35	**1,133**	35	**1,119**	36
Heat purchased	**8**	0	8	0	**7**	0
Electricity purchased	**1,962**	62	**1,986**	62	**1,960**	62
Natural energy	**0.2**	0	**0.2**	0	**0.2**	0
Photovoltaic	0.2		0.2		0.2	
Total	**3,149**	100	**3,199**	100	**3,150**	100

Americas (Unit: TJ)

	Fiscal 2015	(%)	Fiscal 2016	(%)	Fiscal 2017	(%)
Liquid fuel	**188**	24	**169**	27	**168**	37
Renewable energy sourced	5		9		8	
Gaseous fuel	**183**	23	**104**	17	**41**	9
Heat purchased	**-**	-	**-**	-	**-**	-
Electricity purchased	**422**	53	**345**	56	**241**	54
Renewable energy sourced	205		122		-	
Natural energy	**-**	-	**-**	-	**0**	0
Geothermal heat	-		-		0	
Total	**793**	100	**618**	100	**450**	100

EMEA (Unit: TJ)

	Fiscal 2015	(%)	Fiscal 2016	(%)	Fiscal 2017	(%)
Liquid fuel	**167**	26	**177**	27	**137**	22
Gaseous fuel	**95**	15	**95**	15	**97**	15
Renewable energy sourced	-		8		7	
Heat purchased	**0**	0	**0**	0	**0**	0
Electricity purchased	**346**	53	**337**	52	**352**	56
Renewable energy sourced	258		278		276	
Natural energy	**43**	7	**41**	6	**45**	7
Wind	7		6		6	
Woodchip	36		35		37	
Geothermal heat	-		-		1	
Total	**651**	100	**650**	100	**631**	100

Asia/Oceania (Unit: TJ)

	Fiscal 2015	(%)	Fiscal 2016	(%)	Fiscal 2017	(%)
Liquid fuel	**0.1**	0	**0.1**	0	**0.1**	0
Gaseous fuel	**0.7**	1	**0.2**	0	**0.2**	0
Heat purchased	**18**	34	**19**	37	**20**	40
Electricity purchased	**34**	65	**32**	62	**30**	59
Natural energy	**-**	-	**-**	-	**-**	-
Total	**53**	100	**51**	100	**51**	100

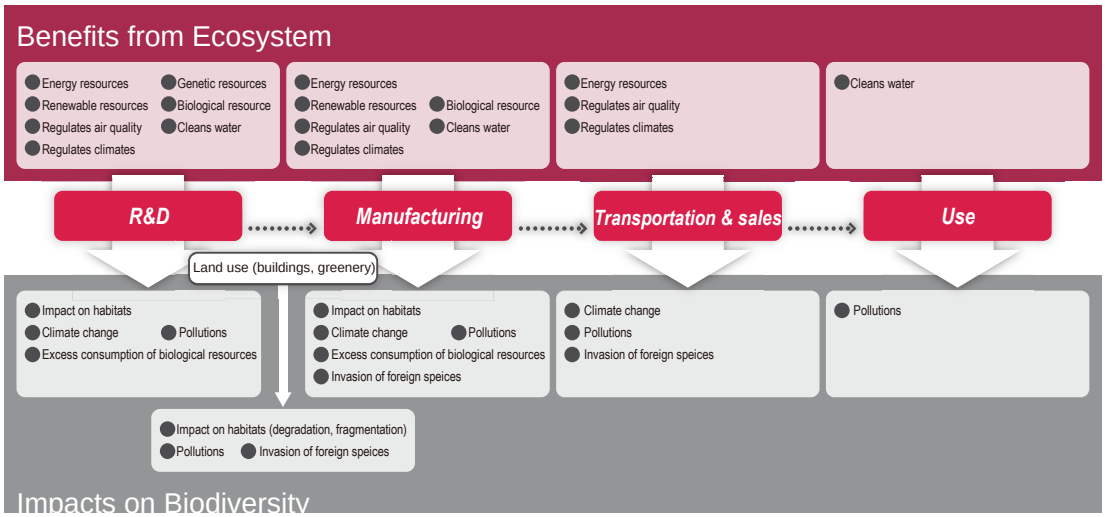
Preserving Biodiversity

Astellas is thankful for the benefits brought about by biological diversity, and understands its business activities in all fields have an impact on ecosystems. We will make a positive contribution to the preservation of biodiversity by working to lessen that impact. Furthermore, we will actively contribute to the creation of a society that coexists with the natural world, enabling the preservation of biodiversity and the sustainable use of the benefits of healthy ecosystems.

Basic Policy on Biodiversity

- We will endeavor to lessen our overall environmental impact on biodiversity by working to implement Climate Change Mitigation Measures, minimize environmental pollution, and promote resource recycling.
- We will endeavor to develop technologies that lessen the impact on ecosystems by lowering the burden we place on the environment and using as few natural resources as possible.
- We will endeavor to handle genetic resources in accordance with international standards and the regulations of producing nations.
- We will endeavor to broaden our efforts to preserve biodiversity with the aim of creating a sustainable society that coexists in harmony with nature. To this end, we will promote discussion within society and among affected parties, while reaching across national and geographical borders.
- We will endeavor to foster a corporate culture that will always act with respect for biodiversity and in a manner that is harmonious with our business activities, grateful for the benefits obtained from healthy ecosystems.

■ Biodiversity and Astellas



■ Biodiversity Index

Astellas assesses the three main factors that are causing the deterioration of biodiversity as being environmental pollution, resource consumption, and climate change, and has created a Biodiversity Index to evaluate the impact of its business activities on biodiversity.

The environmental burden for each sub-category in the assessment fiscal year is divided by the corresponding burden in the base-year and then multiplied by the weight to derive the "biodiversity burden index." The "biodiversity index" is calculated by dividing Astellas' consolidated sales in the assessment fiscal year by the total of all the biodiversity burden index figures. Improvement can be determined by comparing this index to the base year.

$$\text{Biodiversity Index} = \frac{\text{Consolidated sales in assessment fiscal year}}{\sum\left(\frac{\text{Burden in assessment fiscal year}}{\text{Burden in the base year}} \times \text{Weight}\right)}$$

Categories	Sub-Categories	Weight (%)
Environmental pollution	NOx, SOx emissions	10
	Chemical substances emissions	10
	BOD, COD load	10
	(subtotal)	(30)
Resource consumption	Water withdrawal (global)	20
	Biological raw material usage	10
	Landfill waste volume	10
	(subtotal)	(40)
Climate Change	GHG emissions (global)	30
	(subtotal)	(30)
Total		100

Environmental Action Plan (Biodiversity)

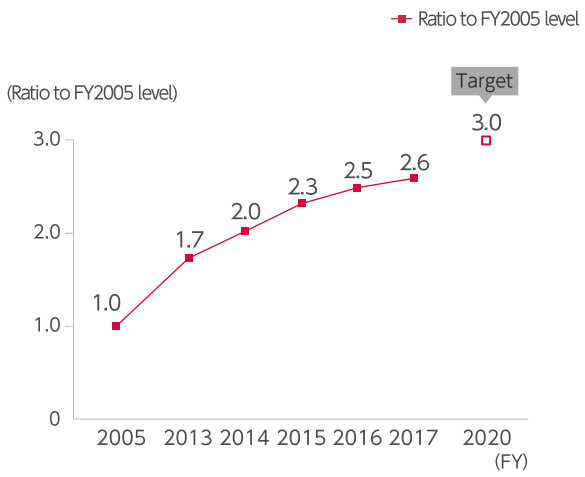
■ Raise the Biodiversity Index to triple the fiscal 2005 level by fiscal 2020. (Global)

■ Changes in Action Plan (Biodiversity)

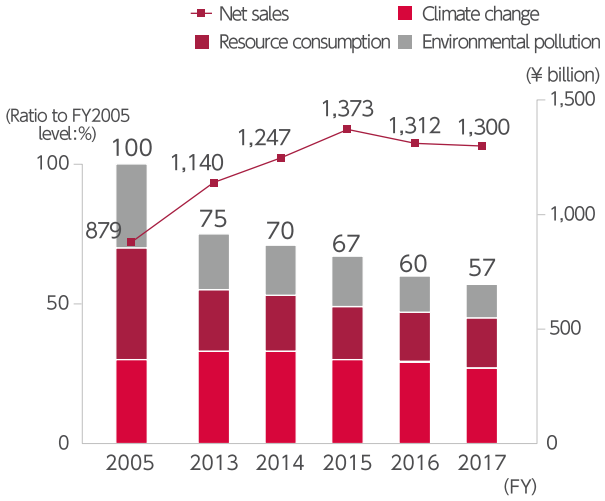
The Biodiversity Index for fiscal 2017 came in at 2.6 times the figure recorded in fiscal 2005. As the scope of the Environmental Action Plan has expanded regarding climate change, so has the scope of each index used to calculate the Biodiversity Index. The following graph has been recalculated from past indices. We will continue our current activities aiming to achieve our targets by the end of fiscal 2020.

Beyond the region, Astellas believes that by minimizing the impact of its business activities on the environment, the Company will help suppress the deterioration of biodiversity and realize an environment in which sustainable business activities may be continued.

Biodiversity Index



Biodiversity Burden Index and Sales



■ Sustainable Biodiversity Initiatives through Social Contribution Activities

Among the principal factors responsible for the deterioration of biodiversity, degradation of *satochi-satoyama* natural rural area is said to be caused by the loss of human intervention coupled with modernization. Astellas recognizes the difficulty in direct involvement with this issue in the course of our business activities. Despite this difficulty, we are keen to pursue initiatives through our social contribution activities in cooperation with external organizations.

In fiscal 2017, we held our sixth event of tree planting on the slopes of Mount Tsukuba. More than 100 participants, including Astellas employees together with their family members on a volunteer basis, planted around 600 seedlings on Mount Tsukuba. Of these, roughly 140 had been grown from acorns collected by members of staff of the Tsukuba Research Center within the center's grounds.

Cyclic Use of Resources

Astellas recognizes that since the use of sustainable resources is essential for continuing its business activities, it must play an active role in the creation of a recycling-oriented society. We have established an Environmental Action Plan and are moving forward with steps to effectively use water resources and recycle waste materials (reuse, recycling, and use of all thermal energy) as initiatives contributing to a recycling-oriented society.

Environmental Action Plan (Measures for the Conservation of Resources)

■ **Enhance water resource productivity by around 2.5 times the fiscal 2005 result by the end of fiscal 2020.**

Applicable area: Research and production site

Indicator : $\frac{\text{Sales (¥ billion)}}{\text{Water resource withdrawn(thousand m}^3\text{)}}$

Environmental Action Plan (Waste Management)

■ **Improve waste generated per unit of sales to around 20% of fiscal 2005 result by the end of fiscal 2020.**

Applicable area: Research and production site

Indicator : $\frac{\text{Waste generated (tons)}}{\text{Sales (¥ billion)}}$

■ Effective Use of Water Resource

The effective use of water resources serves as a useful indicator for gauging society's impact on biodiversity. Astellas has assessed the relationship between water resources and economic activity by a water resource productivity index, and has been striving to improve this index. Water resource productivity for fiscal 2017 has improved 2.9 times compared with the base year of fiscal 2005.

Changes in Water Resources Withdrawn and Sales

		Fiscal 2005	Fiscal 2016	Fiscal 2017
water resource withdrawn (thousand m³)		**17,055**	**8,788**	**8,821**
Japan	Surface water	14,012	7,719	7,738
	Groundwater	2,479	758	853
Americas	Surface water	289	146	61
EMEA	Surface water	235	145	150
	Groundwater	16	-	-
Asia/Oceania	Surface water	24	21	20
Among them, research and production sites		**16,990**	**8,774**	**8,813**
Sales (¥ billion)		**879**	**1,312**	**1,300**
Water resource productivity (¥ billion /1,000 m³)		**0.05**	**0.15**	**0.15**
Base year ratio (Times)		**-**	**2.9**	**2.9**

■ Recycling of Water

At Astellas, water used in work operations is treated in accordance with wastewater discharging standards and returned to an aquatic environment. The amount of water recycled is almost equivalent to the entire amount of water intake.

■ Risk Assessments

Astellas uses the Global Water Tool™ provided by the World Business Council for Sustainable Development (WBCSD) to analyze water risks specific to the operating regions where its plants and other facilities are located.

The Astellas Group on a global basis does not currently withdraw water from water bodies in areas concerned with water resource depletion. As water risks may emerge in the future as a result of climate change, we are taking steps to minimize our dependence on such resources, and also regard this as an effective means of ensuring business continuity.

■ Waste Management

Astellas is promoting efforts to reduce the waste landfill volume to as close to zero as possible through the proactive recycling and reuse of waste materials. Moreover, Astellas also evaluates the relationship between the waste generation volume and economic activities with the index known as the Waste generated per unit, and the Company is making efforts to improve it. In fiscal 2017, the Waste generated per unit has improved 21% over the base year (fiscal 2005).

Changes in Waste Generation Volume and Sales

	Fiscal 2005	Fiscal 2016	Fiscal 2017
Waste generated (tons)	**44,771**	**13,920**	13,964
Japan	38,476	11,836	11,565
Americas	551	54	1
EMEA	5,621	1,976	2,339
Asia/Oceania	123	54	59
Sales (¥ billion)	**879**	**1,312**	**1,300**
Waste generated per unit (tons/¥ billion)	**51**	**11**	**11**
Base year ratio (%)	**-**	**21**	**21**

■ Waste Management in the Value Chain

In waste management, it is also important to prevent environmental pollution being caused by hazardous waste generated by research centers and manufacturing plants and the illegal disposal of that waste. As a means of prevention, we first examine appropriate methods of waste disposal, and then conduct regular on-site assessment that waste treatment contractors are using appropriate waste treatment methods.

■ State of PCB-contaminated Waste Storage

We have been systematically conducting detoxification of any equipment that is contaminated with PCBs stored by Astellas. Load-figure registrations for all items stored at each of our business facilities have been completed. In fiscal 2017, we conducted waste disposal at multiple business facilities, and the waste storage situation at the end of March 2018 was as follows.

State of PCB-contaminated Waste Storage

Load-figure	Weight (kg)
Drum	10,073
Pail	37
Glass container	0.3

Initiatives for Preventing Pollution

Astellas is promoting regional environmental pollution prevention activities. We set and manage voluntary control values that are stricter than legal standards and pollution control agreements for the major environmental management indicators used to measure air quality and water quality. In addition, we are promoting voluntary activities to reduce the discharge of chemical substances into the atmosphere.

■ Air pollution – reduction of VOC emissions

Astellas sets voluntary numerical targets for reducing the amount of volatile organic compounds (VOCs) it discharges accompanying the use of solvents in production and research activities, and makes efforts to reduce emissions. Moreover, we have taken steps to minimize the impact of our business operations on our employees, the regional communities in which we work, and the global environment. Such steps include measures to prevent environmental pollution by chemical substances as well as workplace accidents and health hazards, and take the form of adopting new production methods that do not employ high-risk chemicals.

■ Air pollution – reduction of NOx emissions

To reduce the emission of NOx into the atmosphere, Astellas has installed boilers that use gaseous fuels (city gas, LNG, and LPG). The NOx emissions from all business sites in Japan are as shown in the table below. The NOx emissions from non-Japanese production sites in fiscal 2017 amounted to 4 tons.

Astellas does not use equipment that runs on fuel oil, and thus SOx (sulfur oxide) emissions are not discharged.

Changes in Emission volume (tons)

Substance	Fiscal 2013	Fiscal 2014	Fiscal 2015	Fiscal 2016	Fiscal 2017
VOC	**51**	**44**	**42**	**49**	**34**
NOx	**30**	**28**	**25**	**29**	**22**

VOC：Plants and research facilities in Japan
NOx：All business facilities in Japan (excluding branches and sales offices)

■ Further Information on the PRTR System

Japan's PRTR Act designates substances harmful to human beings and recognized to widely exist in the environment. The main aim of the act is to confirm the nature of the emissions and transfers of a company and link the results to independent assessments and improvement of voluntary chemical substance management. The table below shows the release and transfer of PRTR-designated substances that we identified and reported on in fiscal 2017. Our total amount of designated chemical substances released into the environment in fiscal 2017 was 7 tons, representing a continuing decrease.

※ Refers to chemical substances designated under Japan's Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (Pollutant Release and Transfer Register Law).

■ Water Pollution

Astellas measures the extent of its impact on aquatic environments using the biochemical oxygen demand (BOD) load as an index in Japan and the chemical oxygen demand (COD) load as an index in other countries, and makes the data available to the public. In Japan, the BOD load in fiscal 2017 was 11 tons, slightly down from the previous fiscal year. Outside Japan, the COD in fiscal 2017 was 26 tons, slightly up from the previous year.

Since the discharge into water of chemical substances used in manufacturing processes can have a negative impact on ecosystems, we are examining ways of reducing such discharges as much as possible at all stages from R&D onward. With respect to future drug candidate substances discovered and developed by Astellas, we are examining the impact pharmaceuticals would have on ecosystems through the evaluation of their biodegradability in the natural environment. In addition, from fiscal 2015 we evaluated our wastewater management method by using bioassays targeting business facilities that were releasing wastewater into rivers after treatment. We confirmed that they are now less likely to have a significant impact on the ecosystem.

Changes in BOD Load (tons)

Substance	Fiscal 2013	Fiscal 2014	Fiscal 2015	Fiscal 2016	Fiscal 2017
BOD	**9**	**12**	**11**	**12**	**11**
Drainage into rivers	7	10	10	10	8
Drainage into sewer system	2	2	2	2	3

Target: all Japanese production facilities and R&D Centers

Changes in Drainage volume (thousand m^3)

Destination	Fiscal 2013	Fiscal 2014	Fiscal 2015	Fiscal 2016	Fiscal 2017
Drainage volume	**8,566**	**8,308**	**7,416**	**7,209**	**7,377**
Drainage into rivers	8,159	7,948	7,098	6,984	7,151
Drainage into sewer system	406	360	318	225	226

Target: All business facilities in Japan (excluding branches and sales offices)

Releases and transfers of PRTR chemical substances in fiscal 2017 (tons)

Substance	Volume handled	Volume released			Volume transferred	
		Air	Water	Soil	Waste	Sewerage
Acetonitrile	22.764	0.541	0.000	0.000	4.232	0.000
Chloroform	15.633	2.814	0.000	0.000	12.819	0.000
Dichloromethane (Methylene chloride)	39.239	2.768	0.000	0.000	0.072	0.000
N,N-dimethylformamide	8.902	0.000	0.001	0.000	1.484	0.000
Sodium Dodecyl Sulfate	6.606	0.000	0.000	0.000	0.000	0.000
Toluene	1.386	0.000	0.000	0.000	1.386	0.000
nn-Hexane	5.347	0.962	0.000	0.000	4.384	0.000

Target: Plants and research facilities in Japan

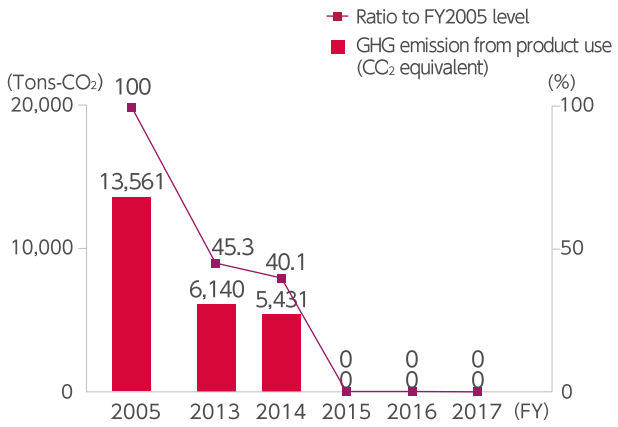
Environmental Impact of Products and Countermeasures

■ Greenhouse Gases

Although Astellas sold one pharmaceutical product that uses hydrofluorocarbons (HFCs) as a filler agent, from fiscal 2015 Astellas has not sold any products that emit GHG during use phase because at the end of March 2015 we ceased selling said products in line with our sales strategy concerning related products.

We have introduced technology that enables fine-powdered agents to be easily quantitatively inhaled by newly developed inhalation device products. In this manner, we are striving to reduce the environmental impact.

GHG emissions from product use

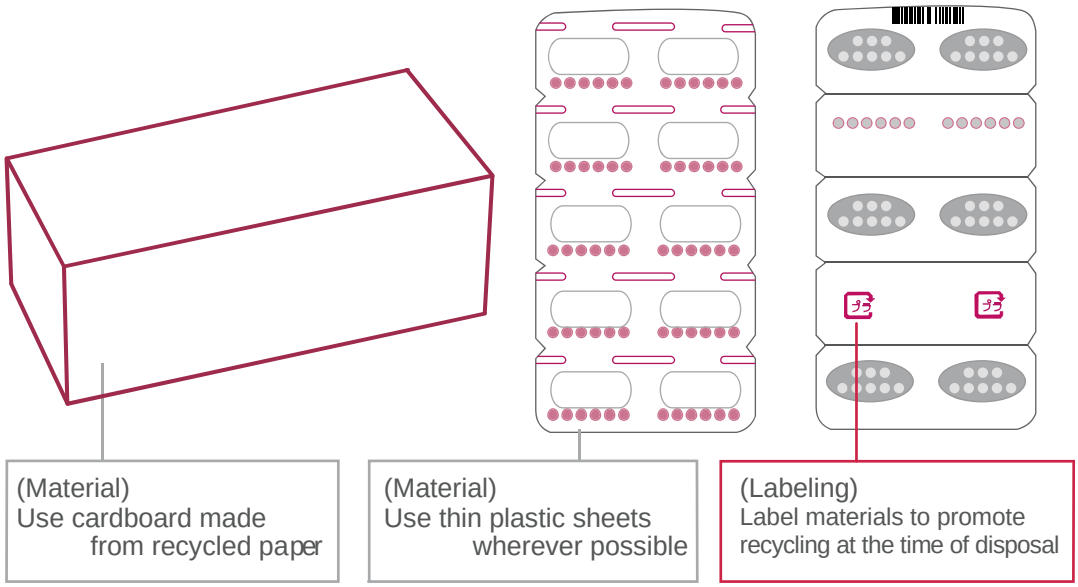


■ Containers and Packaging Recycling

The products manufactured and marketed by the Company are administered to patients through medical institutions. After their use, packaging materials are disposed of by hospitals, pharmacies, and general households. The waste discarded by general households is mainly comprised of PTP (plastic) packaging used for tablets and capsules. Hospitals and pharmacies discard PTP packaging as well as various types of plastics including bottles and tubes, metals, glass materials used in injectable solutions products, and such paper items as individual packaging and cardboard boxes.

In the case of pharmaceutical packaging, certain functions remain essential to ensure the safe storage of products as well as compliance with the provisions stipulated under the Pharmaceutical and Medical Device Act of Japan. In addition to these functions and requirements, Astellas selects environmentally friendly materials for use in its packaging while engaging in a variety of initiatives including the labeling of materials to promote recycling at the time of disposal.

To encourage the recycling of containers and packaging for household use in Japan, in accordance with the Containers and Packaging Recycling Law (which mandates the sorted collection of containers and packaging, and promotes their reuse in commercial products) sellers of products are responsible for defraying the costs of recycling of such waste products. The estimated total amount of plastic and paper containers and packaging used in Astellas products in fiscal 2017 is 536 tons, and the Company was requested to pay ¥17.42 million in recycling costs.



Environmental Accounting

Astellas calculates the costs of investment and expenses related to environmental conservation for its facilities in Japan and their outcomes based on the Ministry of the Environment's "Environmental Accounting Guidelines."

Environmental conservation costs in fiscal 2017 comprised ¥1,134 million in investments and ¥1,182 million in expenses (including depreciation costs). The main investments for preventing pollution were in the maintenance of wastewater treatment plants and the repair of underground water-supply pipelines. Among investments in global environmental protection, devices scheduled for servicing, including a small reflux boiler and refrigeration equipment, were updated. The economic benefits generated through environmental protection activities amounted to ¥67 million, which includes lower costs owing to energy savings, the sale of waste organic solvents and waste metals, lower costs of treating waste materials and the purchase of regenerated organic solvents. In fiscal 2016, we completed all the load-figure registrations of high-concentration PCBs and calculated the cost based on the weight, including the containers. As a result of the PCB disposal having progressed in part, the allowance for the current PCB treatment amounted to ¥255 million.

■ Total environmental conservation costs in fiscal 2017

(¥ million)

Category			Environmental Conservation Costs			
			Investments	Costs		
				Total	Expense	Depreciation
Business Area Cost			492	1,254	891	363
Breakdown	Pollution Prevention	Prevention of atmospheric pollution	20	193	179	14
		Prevention of water pollution	179	269	189	79
		Prevention of soil contamination	0	9	4	5
		Prevention of noise, bad odors and vibrations	12	3	2	1
		Other	18	5	2	3
		Subtotal	229	478	376	102
	Global Environmental Conservation	Mitigation of climate change	21	232	35	197
		Prevention of Ozone layer depletion	243	74	74	0
		Management of chemical substances	0	90	86	3
		Other	0	36	0	36
		Subtotal	264	431	195	236
	Resource Circulation	Efficient use of wastes	0	174	174	0
		Conservation of water	0	0	0	0
		Treatment of wastes	0	147	124	23
		Other	0	23	22	1
		Subtotal	0	345	320	25
Upstream/Downstream costs			0	53	53	0
Administration costs			1	217	217	0
R&D costs			30	61	49	12
Social activity costs			0	1	1	0
Environmental remediation costs			0	293	293	0
Total			523	1,879	1,504	375
Total environmental conservation costs, excluding environmental remediation costs			523	1,586	1,211	375

Economic Benefit Related to Environmental Conservation (Quantifiable items only included in calculations)

Measures taken	Economic Benefit related to Environmental Conservation
Cost reductions through energy conservation	50
Sludge drying, reduction in amount of waste liquid disposal contracted out (through increased disposal in-house.	0
Conservation of resources through reuse of solvents, and reduction in fuel purchases through conversion of solvents to fuel	10
Sale of waste solvents	6
Total	67

■ Changes in Environment-related Investments and Expenses

(Unit: ¥ million)

Categories	Fiscal 2013		Fiscal 2014		Fiscal 2015		Fiscal 2016		Fiscal 2017	
	Investment	Expense	Investment	Expense	Investment	Expense	Investment	Expense	Investment	Expense
Pollution Prevention	225	489	146	303	313	324	588	457	229	478
Global Environmental Conservation	730	413	206	113	256	84	330	354	264	431
Resource Circulation	0	432	8	462	64	431	159	322	0	345
Upstream/Downstream costs	0	65	0	53	0	53	0	53	0	53
Administration costs	0	331	28	295	0	283	1	246	1	217
R&D costs	7	36	0	63	24	22	55	83	30	61
Social activity costs	0	2	0	6	0	5	0	3	0	1
Environmental remediation costs	0	255	0	363	0	362	0	293	0	293
Total	**963**	**2,023**	**387**	**1,657**	**657**	**1,565**	**1,134**	**1,812**	**523**	**1,879**

Methods for Calculating Performance Data

■ Methods for Calculating Energy Consumption and GHGs

Type	Conversion Coefficients			
	Calorific value		CO_2 emissions	
Electricity	9.97	GJ/MWh	-- *1	tons/MWh
Kerosene	36.7	GJ/kiloliter	2.49	tons/kiloliter
LPG	50.8	GJ/tons	3.00	tons/tons
LNG	54.6	GJ/tons	2.70	tons/tons
City gas	45.0	GJ/thousand m^3N	2.24	tons/thousand m^3N
Diesel	37.7	GJ/kiloliter	2.58	tons/kiloliter
Gasoline	34.6	GJ/kiloliter	2.32	tons/kiloliter
Purchased thermal energy	1.36	GJ/GJ	0.057	tons/GJ
Steam	2.8	GJ/tons	0.091	tons/GJ

*1 To calculate the CO_2 emissions resulting from electricity usage, Astellas uses CO_2 emission coefficients provided by the electric power companies that supply each business facility. In the case of Japan, we use the most recent emission coefficient of each electric power company announced by the Ministry of the Environment and the Ministry of Economy, Trade and Industry. In other regions where individual coefficients cannot be obtained, we use the latest country-specific coefficients provided in the International Energy Agency (IEA).

*2 In converting the amount of power generated by renewable energy sources such as photovoltaics and wind into energy value in Joule, we have used a conversion rate of 3.6 MJ per 1 kWh.

■ Calculation Method for Scope3 Emissions

Categories	Basis for calculation and calculation method	Emission source unit
1 Purchased goods and services	**Based on: Purchase price (¥ million)** Purchase monetary amount of raw material x emission source unit of each raw material	Target: Production bases in Japan Emission source unit: • Source: The Ministry of the Environment's database*[5]; emission source units based on the industry-related table Emission source unit on monetary basis for each raw material (purchaser price basis)
2 Capital goods	**Based on: Capital expenditures (¥ million)** Facility investment amount (consolidated) x emission source unit per price of capital goods	Target: Global Emission source unit: • Source: The Ministry of the Environment's database*[6]; emission source units per price of capital goods (Secretariat) Pharmaceuticals 2.83 t-CO_2 equivalent / million yen
3 Fuel and energy related activities (not included in Scope 1 and Scope 2)	**Based on: Consumption of each type of energy (GJ)** Usage amount of purchased fuel, electricity, heat, etc. x emission source units per usage amount for each energy type	Target: Global Emission source unit: • Source: The Ministry of the Environment's database*[7]; emission source units per usage amount of electricity and heat (Secretariat) • Source: "Carbon footprint communications program, Basic database Ver. 1.01"
4 Transportation and distribution	**Based on: Fuel usage (kiloliter), Energy consumption (MWh)** CO_2 emissions during transportation: Calculation method for CO_2 emissions from energy sources related to cargo transportation by transportation carrier stipulated by Act on the Rational Use of Energy CO_2 emissions at distribution warehouses: Electricity usage amount x emission source unit	Target: Transport in Japan Emission source unit during transportation: • Source: Calculation of Greenhouse Gas Emissions Calculation: Reporting Manual (Ver4.3.1) Electricity emissions intensity: • The latest adjusted emission coefficient for each power supplier
5 Waste generated in operation	**Based on: Shipping weight and distance (tons*km)** CO_2 emissions generated during industrial waste transportation: Calculation method for CO_2 emissions from energy sources related to cargo transportation by transportation carrier stipulated by Act on the Rational Use of Energy CO_2 emissions generated during industrial waste treatment: Amounts of recycled industrial waste, incineration processing, and direct landfill processing x waster type/emission source unit by processing method	Target: Production bases in Japan Emission source unit during industrial waste transportation: • Source: Calculation of Greenhouse Gas Emissions: Reporting Manual (Ver4.3.1) Emission source unit during industrial waste transportation: • Source: The Ministry of the Environment's database*[8]; emission source units by waste type (Secretariat) (excluding waste transportation stage)
6 Business travel (by airplane)	**Based on: Distance traveled (1,000 people*km)** Number of persons using airplanes x distance between airports for each flight x emission source unit	Target: Global (Results compiled from all airplane flights except for Asia (excluding China) and Oceania regions) Flight distance between airports: Calculated by assuming flight is a straight line connecting two points on the earth's surface Emission source unit: • Source: A calculation sheet made public by Defra (The Department for Environment, Food and Rural Affairs, UK) Emission source unit by flight class and distance
7 Employee commuting	**Based on: Distance traveled (1,000 people*km)** Train: Number of persons commuting by train x distance x emission source unit Bus: Number of persons commuting by bus x distance x emission source unit Car: Number of persons commuting by car x distance x emission source unit	Target: Japan (Number of commuting days per year: 238 days) Emission source units of trains and buses: • Source: The Ministry of the Environment's database*[10]; emission source units per traveler- kilometer (Secretariat) Emissions source unit of cars: Cars: Astellas internal regulations for private-use car commuting expenses • Source: Ministry of Land, Infrastructure, Transport and Tourism's "Survey on Motor Vehicle Fuel Consumption Statistics for 2015" Fuel consumption rate of gasoline by private-use car (11.6 km/L)
11 Use of sold products	**Based on: Shipment volume (Number of shipments x volume containing HFC/shipment) (Tons-HEC)** Amount of HFC used as fillers in inhalation-type medical drugs x GWP	Target: Japan Targets sold inhalation-type medical drugs (HFC specification products)
12 End-of-life treatment of sold products	**Based on: Weight of containers and packaging (Tons)** Usage volume of sold products when end-of-life treatment is approached in line with the laws on recycling containers and packaging x emission source unit	Target: Japan Emission source unit: • Source: The Ministry of the Environment's database*[9]; emission source units by waste type (Secretariat) (including waste transportation stage)

The Ministry of the Environment's database: The Ministry of the Environment's emission source unit database (ver. 2.5) for calculating greenhouse gas emissions through the supply chain (March 2018)

Site Data (major facilities)

Nishine Plant

INPUT		
Energy	Electricity	10,116 MWh
	Kerosene	- kiloliter
	LPG	2 tons
	LNG	1,186 tons
	City gas	- thousand m³
	Diesel	1 kiloliter
	Gasoline	1 kiloliter
Water	Surface water	- thousand m³
	Groundwater	393 thousand m³
OUTPUT		
Air	GHG	9 kilotons
	NOx	1 tons
	VOC	11 tons
Water bodies	into rivers	393 thousand m³
	Sewerage system	- thousand m³
	BOD load	0 tons
	COD load	0 tons
Waste	Generated	353 tons
	Landfill	9 tons

Takahagi Facilities

INPUT		
Energy	Electricity	23,130 MWh
	Kerosene	- kiloliter
	LPG	- tons
	LNG	1,176 tons
	City gas	- thousand m³
	Diesel	0 kiloliter
	Gasoline	- kiloliter
Water	Surface water	2,420 thousand m³
	Groundwater	- thousand m³
OUTPUT		
Air	GHG	15 kilotons
	NOx	4 tons
	VOC	0 tons
Water bodies	into rivers	2,420 thousand m³
	Sewerage system	- thousand m³
	BOD load	3 tons
	COD load	7 tons
Waste	Generated	1,920 tons
	Landfill	44 tons

Yaizu Facilities

INPUT		
Energy	Electricity	55,141 MWh
	Kerosene	- kiloliter
	LPG	0 tons
	LNG	- tons
	City gas	7,236 thousand m³
	Diesel	1 kiloliter
	Gasoline	0 kiloliter
Water	Surface water	338 thousand m³
	Groundwater	312 thousand m³
OUTPUT		
Air	GHG	42 kilotons
	NOx	3 tons
	VOC	0 tons
Water bodies	into rivers	639 thousand m³
	Sewerage system	- thousand m³
	BOD load	1 tons
	COD load	1 tons
Waste	Generated	504 tons
	Landfill	7 tons

Toyama Technology Center

INPUT		
Energy	Electricity	36,212 MWh
	Kerosene	- kiloliter
	LPG	0 tons
	LNG	- tons
	City gas	4,426 thousand m³
	Diesel	4 kiloliter
	Gasoline	2 kiloliter
Water	Surface water	2,601 thousand m³
	Groundwater	37 thousand m³
OUTPUT		
Air	GHG	29 kilotons
	NOx	2 tons
	VOC	10 tons
Water bodies	into rivers	1,675 thousand m³
	Sewerage system	- thousand m³
	BOD load	2 tons
	COD load	6 tons
Waste	Generated	6,674 tons
	Landfill	46 tons

Takaoka Plant

INPUT		
Energy	Electricity	12,155 MWh
	Kerosene	- kiloliter
	LPG	1,681 tons
	LNG	- tons
	City gas	- thousand m^3
	Diesel	1 kiloliter
	Gasoline	1 kiloliter
Water	Surface water	2,039 thousand m^3
	Groundwater	54 thousand m^3
OUTPUT		
Air	GHG	12 kilotons
	NOx	3 tons
	VOC	0 tons
Water bodies	into rivers	2,024 thousand m^3
	Sewerage system	- thousand m^3
	BOD load	3 tons
	COD load	3 tons
Waste	Generated	180 tons
	Landfill	4 tons

Tsukuba Research Center

INPUT		
Energy	Electricity	40,572 MWh
	Photovoltaics	49 MWh
	Kerosene	- kiloliter
	LPG	- tons
	LNG	- tons
	City gas	7,500 thousand m^3
	Diesel	0 kiloliter
	Gasoline	2 kiloliter
Water	Surface water	296 thousand m^3
	Groundwater	0 thousand m^3
OUTPUT		
Air	GHG	37 kilotons
	NOx	9 tons
	VOC	11 tons
Water bodies	into rivers	- thousand m^3
	Sewerage system	183 thousand m^3
	BOD load	2 tons
	COD load	2 tons
Waste	Generated	864 tons
	Landfill	27 tons

Tsukuba Bio Research Center

INPUT		
Energy	Electricity	6,439 MWh
	Kerosene	- kiloliter
	LPG	- tons
	LNG	- tons
	City gas	331 thousand m^3
	Diesel	- kiloliter
	Gasoline	0 kiloliter
Water	Surface water	28 thousand m^3
	Groundwater	- thousand m^3
OUTPUT		
Air	GHG	4 kilotons
	NOx	0 tons
	VOC	1 tons
Water bodies	into rivers	- thousand m^3
	Sewerage system	27 thousand m^3
	BOD load	0 tons
	COD load	- tons
Waste	Generated	840 tons
	Landfill	3 tons

Kyoto Suzaku Office

INPUT		
Energy	Electricity	2,685 MWh
	Kerosene	- kiloliter
	LPG	- tons
	LNG	- tons
	City gas	264 thousand m^3
	Diesel	- kiloliter
	Gasoline	- kiloliter
Water	Surface water	8 thousand m^3
	Groundwater	- thousand m^3
OUTPUT		
Air	GHG	2 kilotons
	NOx	0 tons
	VOC	0 tons
Water bodies	into rivers	- thousand m^3
	Sewerage system	7 thousand m^3
	BOD load	0 tons
	COD load	- tons
Waste	Generated	28 tons
	Landfill	1 tons