P012-E0183

SHIMADZU
Excellence in Science

SHIMADZU ENVIRONMENTAL REPORT 2016

For the Well-being of both Mankind and the Earth
SHIMADZU

Corporate Philosophy

Contributing to Society through Science and Technology

Management Principle

Realizing Our Wishes for the Well-being of Both Mankind and the Earth

Around 1870, Kyoto City promoted modern industry by constructing state-run industrial laboratories as well as research and educational facilities. Genzo Shimadzu Sr., Company founder, learned about the latest technologies at that time through educators and researchers who had been invited from the U.S. and Europe meanwhile he manufactured educational physical and chemistry instruments that these educators and researchers desired. With this, Shimadzu Corporation was founded in Kyoto about 140 years ago (year 1875).

Since Shimadzu's foundation, its predecessors' intentions to provide what clients needed continues today, as illustrated by our stance to contribute to the realization of a more convenient, safe, and secure society with innovations in science and technology that respond to the needs of society and clients.

We can say that Shimadzu's history is characterized by social contribution activities.

The science and technology is becoming increasingly important for solving issues facing society, which are becoming more diversified and complex.

We will continue to work tirelessly to acquire new knowledge and skills and contribute to society by proactively providing solutions to problems; thus, we strive to create something new that has not existed before or achieve something that no one has ever accomplished before. Examples include the following:

Akira Nakamoto
Representative Director,
Chairman of the Board

1875
Founding Shimadzu by manufacturing educational physical and chemistry instruments

1877
Successfully launching Japan's first manned balloon flight
Revitalizing Kyoto after capital relocation

1897
Starting manufacture of rechargeable batteries
Developing technologies to support improvements of infrastructures, such as railroads and communications

1909
Building Japan's first medical X-ray device
Enhancing opportunities for diagnostic imaging through domestic manufacturing

1914
Succeeding inmanufacturing vacuum pumping
Developing bulbs and vacuum pipes to advance vacuum technology

1927
Establishing a Shimadzu X-ray technical training center (currently, Shimadzu Gakuen)
Promoting and developing radiology through the cultivation of human resources

For a Comfortable and Convenient Lifestyle

For a Safe and Secure Life

1936

Starting manufacture of aircraft components and instruments

Contributing to Japan's aircraft industry in its early developmental stage

1956

Developing Japan's first gas chromatograph

Contributing to the growth of industry and prevention of pollution by supporting technologies in the petrochemical field

1961

Developing world's first remote-controlled X-ray TV system

Reducing radiation technologists' exposure to radiation

1975

Developing large-scale structure testing machines

Contributing to urban security and comfortable lifestyles with tall buildings, large bridge piers, et cetera

1996

Starting support for the United Nations University's project, "Environmental Monitoring and Analysis in the East Asian Region" (current)

Promoting conservation of the environment in Asia by providing people, resources, technologies, and funds

2002

Celebrating Koichi Tanaka's recognition as a recipient of the Nobel Prize in Chemistry

Developed mass spectrometric technique working as a cutting-edge platform

2010

Developing and releasing the nation's first high-end liquid chromatography mass spectrometer

Contributing to the safety and security of people in the fields of the environment and food

2014

Releasing the Elmammo dedicated PET scanner for breast cancer diagnosis

Promoting early detection and treatment of cancers to reduce the burden and anxiety of patients

140 Years and Many More of Social Contribution, and Developing the Future

Overview of Shimadzu Corporation's Business Operations

Technology that assists toward opening a new future

Shimadzu conducts business in four segments with an aim to contribute to the realization of a more convenient, safe, and secure society with innovations in science and technology developed in response to the needs of society and clients.

Analytical and Measuring Instruments

We contribute to research, technological development, and quality management in a broad range of fields including medicine, food, and materials by providing our high-performance analytical instruments.

Analytical Instruments mass spectrometers, chromatographic analyzers, / photometric analyzers / surface analysis and observation equipment / bio-related analyzers / balances and scales

Environmental Measuring Instruments water-quality measuring equipment / exhaust-gas measuring equipment

High-speed liquid chromatograph mass spectrometer

This is a new mass spectrometer that has achieved the world' s highest sensitivity and highest detection speed. The equipment can measure components in biological samples such as blood collected from humans and respond to the needs of the cutting-edge life science field, including the evaluation of the effectiveness and safety of medicines.

Testing / Non-Destructive Inspection Machines

material testing machines / fatigue testing machines / structure testing machines / non-destructive inspection equipment / high-speed video cameras / particulate measuring equipment

Universal / Tensile Testing machine

Strength testing for any objects can be performed, including materials such as rubber and plastics, food and mobile phones. The testers are used in a wide range of areas such as product development and quality control.

Medical Systems

We contribute to maintenance and improvement of human health by providing our medical devices that help with accurate diagnoses.

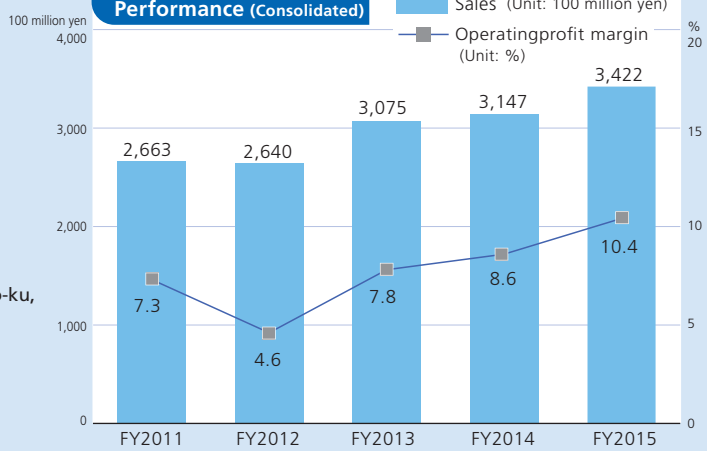
Medical Systems X-ray TV systems / angiography systems / X-ray imaging systems / PET systems / real-time tracking systems for radiation therapy equipment / near-infrared imaging equipment / medical information systems

Angiography System

The system provides sophisticated applications supporting minimally invasive intravascular treatment, and patient-comfort, high-definition images at possible lowest radiation dose, and is in operational in a variety of medical institutions.

Trade Name	SHIMADZU CORPORATION
Establishment	March, 1875
Formation of Limited Company	September, 1917
Capital	Approx. 26.6 billion yen
Number of Employees	3,160 (Shimadzu Corporation only) 11,094 (Shimadzu Group total) (as of March 31, 2016)
Head Office	1, Nishinokyo Kuwabara-cho, Nakagyo-ku, Kyoto 604-8511, Japan
Phone	+81-75-823-1111

Changes in Business Performance (Consolidated)



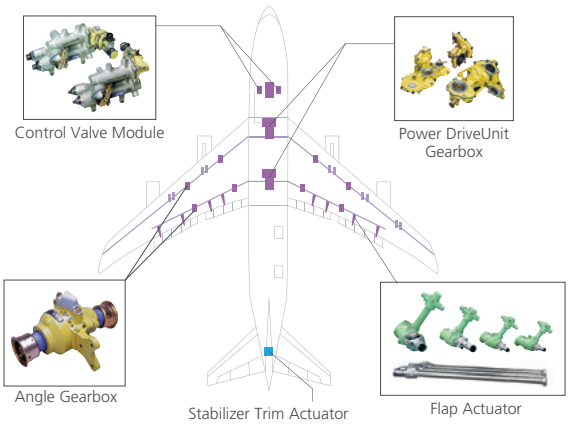
Visit our IR website http://www.shimadzu.com/ir/index.html

Aircraft Equipment

We contribute to security, comfort, and load reduction by providing our cutting-edge aircraft components.

On-Board Equipment flight control systems / air management systems / cockpit display systems and others

Ground Support Equipment aviation equipment functional testers / aviation medicine training equipment



Flight Control Systems

We produce slat and flap actuation systems for safe landing and takeoff. We contribute to safety with high-quality mechanical and high-reliability control technology.

Industrial Machinery

We contribute to industrial progress by supporting front-line manufacturing with our high-performance key components.

Industrial Machines turbomolecular pumps / anti-reflective coating systems for solar cells / high-speed sputtering equipment / anti-reflective coating systems for solar cells / vacuum furnaces / glass winders / gear pumps

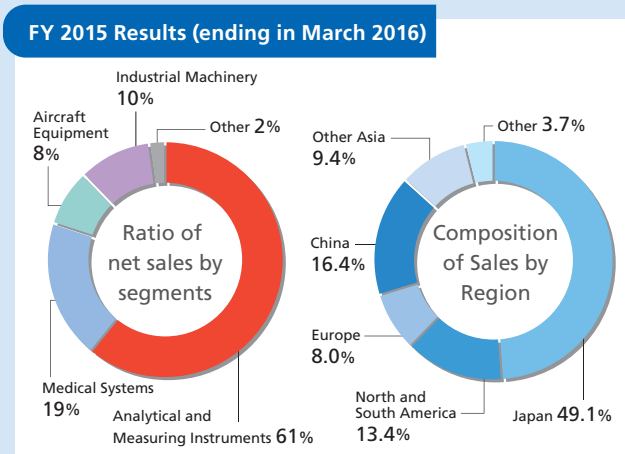
Hydraulic Equipment hydraulic gear pumps / multi-control valves / power packages

Device Components diffraction gratings / laser mirrors / aspherical mirrors / lenses / compact monochromators / spectroscopic sensors / laser modules & laser devices / precision refractometers / MEMS chips / automotive measuring instruments / resin-identification equipment

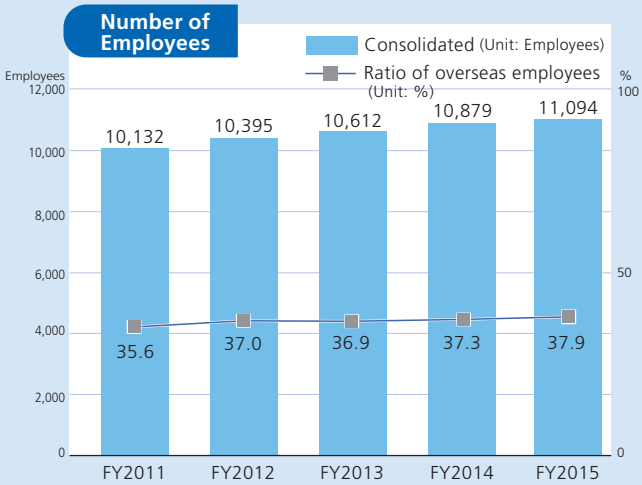
Turbomolecular Pump

These pumps create a vacuum environment that is essential in manufacturing semiconductors and liquid crystals.
We have commercialized turbomolecular pumps with the world' s highest evacuation capability.

FY 2015 Results (ending in March 2016)



Number of Employees



Commitment from Top Management

Plentiful diets, early detection of diseases, and a global environment ensuring safe living are the essential elements for the realization of a society where everyone can enjoy a happy life.
For 140 years, we have been providing solutions for that goal through science and technology, and have formed the current four business segments: Analytical and Measuring Instruments, Medical Systems and Equipment, Aircraft Equipment, and Industrial Machinery. We believe that Shimadzu's corporate value encompasses total values for various stakeholders including customers, shareholders, business partners, employees, and local communities, generated as a result of social contribution (resolution of social issues) through these businesses.

For the sustainable enhancement of this corporate value, we are currently promoting the medium-term management plan (from FY2014 to FY2016) with the basic policy of aiming to "**Become an Innovative Company Contributing to the Growth of Customers Globally,**" under the vision of becoming a "**True Global Business.**" In 2015, we achieved increases in income and profit for three terms in a row, with consolidated net sales of 342.2 billion yen (8.7% increase from the previous year) and operating income of 35.7 billion yen (31.3% increase from the previous year), showing a steady growth.

In the year 2015, which was a turning point for Shimadzu falling on the 140th anniversary of its foundation, we witnessed a heightened global awareness of environmental problems and social issues, as exemplified by the Paris Agreement concluded at the 21st meeting of the Conference of the Parties of the United Nations Framework Convention on Climate Change (COP21) and the adoption of the UN Sustainable Development Goals (SDGs) toward 2030, and many efforts based on long-term strategies were accelerated.

Shimadzu established the "Corporate Governance Policy" in November 2015. Under this policy, we recognize the issues concerning sustainability, including social and environmental problems, as one of the significant business risks, and have been contributing to the solving of environmental problems through business activities, promoting activities for global environment conservation, and working for education, awareness raising, and the prevalence of science and technology.
Among them, we place a particular importance on the contribution to environmental conservation through technological development, which is our main business area, and we are specifically making the following efforts:

- Providing products taking into consideration the reduction of environmental load throughout the product lifecycle (environment-conscious products).
- Providing products contributing to the improvement of social environments through the functions, performance, and usage of the products (environmentally beneficial products) such as analytical and measuring instruments, one of our main lines of business.
- Striving to reduce downtime at the customer end and achieve longer product lifecycles through the fulfillment of after-sales services.

In the future, as our customers try to research new materials, and develop and manufacture products aiming to conserve the environment, we will continue to support them by developing and providing solutions, which we believe will realize a healthy and safe life for all of society, enabling us to pass on the beautiful Earth to future generations.

One of our measures is to establish "innovation centers," which is underway in stages, for the purpose of grasping the specific needs of customers around the globe and developing new products and services that integrate our technology and the cutting-edge knowledge held by research institutes around the world.
We will continue to provide added value unique to Shimadzu and take up the challenge of solving issues in society together with customers.

This report provides information on our contribution to environmental conservation through technological development, and our activities and achievements such as efforts for environmental load reduction in daily business activities and support for external stakeholders.
We would appreciate if you could read the report and give us your candid opinions.

Teruhisa Ueda
President & CEO

Major Performance Indicators for

INPUT

Electricity Usage	56,744 MWh
Gas Usage	686,979 m^3
Fuel Usage	26.2 kL
Water Usage	203,831 m^3
Chemical Substance Usage	206 tons
Paper Usage	100.8 tons
Packaging Materials	608.4 tons

Shimadzu's production bases, research institutes

Reuse of Packaging Materials	4.7 tons

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Environmental Activities in 2015

and major affiliated production companies

OUTPUT

CO_2 Emissions Ref.: Shimadzu Group's CO_2 emissions	32,325 tons -CO_2 46,453 tons -CO_2
NOx Emissions	1.92 tons
SOx Emissions	0 tons (no emission)
Discharged amount of PRTR-reported substances	7.4 tons
Effluents	189,356 m^3
Unnecessary Objects Output	4,134 tons
Waste Output	1,401 tons
Amount Landfilled	26.4 tons

Recycling Ratio
99.4%

Achievements

Number of Eco-Labeled products developed	32 cases
Contribution amount of CO_2 emission reduction	6,800 tons-CO_2 for sales in 2015 25,000 tons-CO_2 for accumulated sales from 2010
Number of participants in Shimadzu Forest Project	1,287 people (from FY2008 to FY2015)
External support activities	Support for 72 events and 2,949 people (1,703 employees joined from Shimadzu)

Major Awards and Recognition

- Nikkei Environmental Management Survey — 112th out of 413 companies
- CDP Ranking — Disclosure Score: 93, Performance Score: D
- Corporate Activity Award at the 13th Kyoto Environmental Award for 2015
- Forest Workers Association President Award at the Forest Creation Contest for Kyoto's Future
- "Shimadzu Forest" at Sanjo Works in the head office: AAA score from the Japan Habitat Evaluation and Certification Program (JHEP)

Concept and Framework for Environmental Activities

Basic Concept of Our Environmental Activities

We promote environmental activities comprising three pillars, aiming to share the natural environment including resources and ecosystems with future generations.

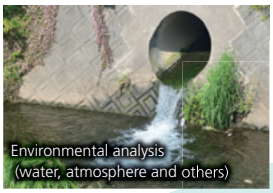
The first pillar is the contribution to global environmental conservation with technological development of products and services we provide. We will proactively supply "Environment-conscious products" designed to have low environmental impacts throughout their lifecycle, such as energy-saving and resource-saving products, and "environmentally beneficial products" that contribute to environmental improvement with functions and usages such as effluent monitoring systems.

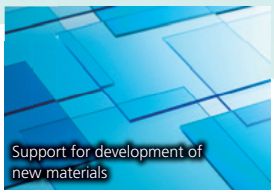
The second pillar is to prevent environmental pollution through reduction of environmental loads in various business activities such as development of products and manufacturing. Based on ISO 14001, we are working for proper management and reduction in emission and usage through continuous improvements.

The third pillar is the support for environmental activities of external stakeholders by using our knowledge and know-how. We carry out positive activities including visiting lectures on the environment at schools, conducting factory tours, giving lectures, preserving local environment around out sites, and others.

Global Environmental Conservation with Technological Development

"Environment-conscious products" designed to have low environmental impacts throughout their lifecycle





"Environmentally beneficial products" contributing to environmental improvement with functions and usages

Three Pillars of Environmental Activities

Support of External Environmental Activities

Development of teaching tools and visiting lectures

Conservation of local ecosystem

Support for United Nations University's project

Community cleanup activity

Reduction of Environmental Load in Business Activities

Global warming countermeasures

Chemical substances management

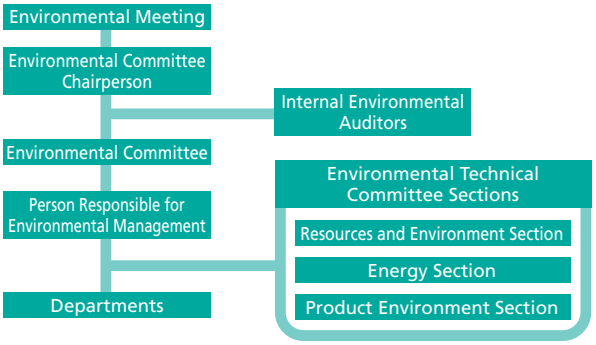
Recycling of resources

Water management

Promotional System for Environmental Activities

As the ultimate deliberative body for environmental issues, we have set up the "Environmental Meeting" chaired by the President, attempting to deal with environmental problems as one of our business challenges. Moreover, we have a company-wide promotional system under the Environmental Committee chaired by executive management based on ISO 14001. With the environmental technical committee sections that handle cross-organizational issues taking the lead, company-wide environmental activities have been proceeding, engaging the production, research and sales bases and major affiliate companies nationwide.

On the other hand, we have a comprehensive management system, closely cooperating with other committee organizations supervising approval and authorization, and safety and health affairs for the entire company.



Environmental Policies of Shimadzu Corporation Head Office and Factories & Related Offices

1. Basic Philosophy

Human health and environmental preservation on a global scale are goals shared throughout the world. As a member of the international community, we at Shimadzu consider global environmental problems as one of our most important concerns, and we conduct our business activities in accordance with the management principle, "Realizing Our Wishes for the Well-being of both Mankind and the Earth." We strive to achieve an abundant society while preserving and protecting the environment.

2. Basic Policies

Business operations at the Head Office and Factories & Related Offices of Shimadzu Corporation (hereafter referred to as Shimadzu Corporation) are committed to expanding the development, manufacture, sales and service of scientific equipment. These include analytical instruments; measuring instruments; testing machines; medical equipment; aircraft equipment; hydraulic equipment; industrial equipment; and bio-products and sensor devices, including environmental analysis and measurement instruments. At the same time, these business operations are dedicated to identifying the impact that business activities at the corporate Headquarter Offices district, our products and their manufacturing processes, and related services may be having on the environment. The continual improvement of our environmental management system actively contributes to steadily reducing the burden on the environment, to preventing pollution and to enhancing the social environment. Such activities are based on the following policies:

(1) Business operations in Shimadzu Corporation will make harmonizing its business activities with the preservation of the global environment one of the highest priorities.

(2) To promote activism for global environment preservation, an organizational system is provided that allows the opportunity for all business organizations, including employees and all people in the site to participate.

(3) The company will contribute to global environmental preservation by engaging in activities to promote environmental education and to raise awareness that employees and all people in the site should be involved in.

(4) The company will work to accurately identify the effects that the business operations have on the environment (such as environmental pollution, resource depletion, global warming, destruction of the ozone layer, loss of biodiversity) and work to constantly increase environmental preservation activities, as much as technologically and economically possible.

(5) The company will strive to observe not only applicable legal requirements regarding environmental aspects, such as international, national and local environmental laws and regulations, but also any other requirements agreed to by the company. To preserve the environment, the company will even establish its own voluntary standards when necessary.

(6) Of the environmental effects that the business activities of our business operation in Shimadzu Corporation may have, promoting preservation activities with respect to the following effects will be given special priority:

1) The company will reduce environmental impacts, promote usage of sustainable resources and prevent environmental pollutions by the business operations.

2) The company will actively provide products whose functions and performance contribute to improvement of social environments (environmentally contributing products) and products that take into consideration the reduction of environmental load through the product lifecycle (environmentally friendly products).

3) The company will reduce greenhouse gases emissions, including CO_2 emissions that lead to global climate change, and contribute to prevention of global warming and realization of a low-carbon society.

4) The company will make every effort to conserve biodiversity by improving on existing environmental activities.

5) The company will support external environmental activities using the know-how accumulated for preserving the environment.

(7) The company will strive to establish communication with local residents and related government organizations, in order to make contributions to the local community.

Hiroshi Fujino

Environmental Committee Chair Head Office and Factories & Related Offices, Shimadzu Corporation

Internal Environmental Auditing

Based on ISO 14001, we conduct periodic internal environmental auditing every year. For fiscal year 2015, 3 environmental technical committee sections and 32 departments and affiliated companies were audited, which identified 13 non-conformities and 59 observations, together with 102 good activities. For the non-conformities, a corrective action plan was created and appropriate measures have been taken to resolve them. For the good activities, we try to horizontally deploy them throughout the company to improve the environmental performance.

Fines, Complaints or Violations

For fiscal year 2015, there were neither violations involving penal fines or non-penal fines due to the violation of environmental laws and regulations, nor was any other type of sanction imposed except fines.

On the other hand, there were four cases of noise complaints from residents in the neighborhood of the factory, which were handled appropriately by taking communication-oriented measures.

Global Environmental Conservation through Technological Development: Environment-conscious Products

Development of Eco-Labeled Products

To make products environmentally friendly, we think it necessary to consider the entire product lifecycle from the procurement of materials and parts to disposal. For that purpose, we design products based on the environmental load reduction design guidelines we formulated internally. We place a particular importance on the reduction of energy, consumables and various chemical substances consumed during use of products, as this can also lead to fewer CO_2 emissions and lower running costs for customers who use the products.

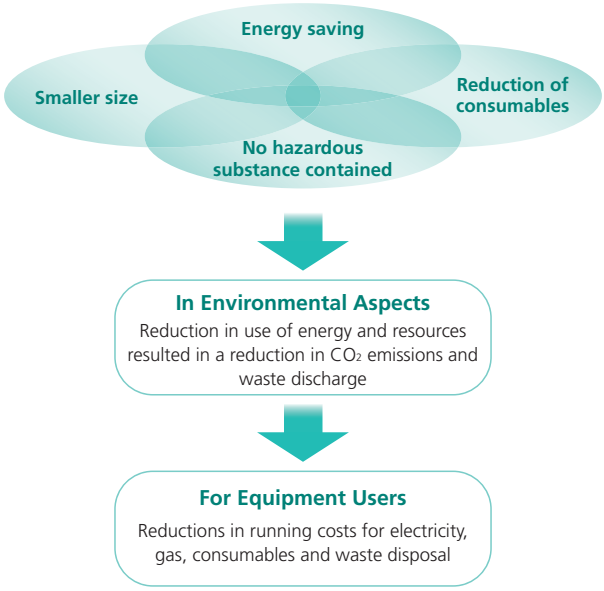
Triple quadrupole gas chromatograph mass spectrometer GCMS-TQ8050

Development of Eco-Labeled Products

In the development and manufacture of new products, we take various environmentally friendly measures such as compliance with environmental laws and regulations stipulated by Japan and other countries supplying products.

Among the environment-conscious products we develop and manufacture, products that have achieved an energy saving of 25% or more compared with traditional models, or products containing no specific hazardous chemical substances, are certified as "Eco-Labeled products."

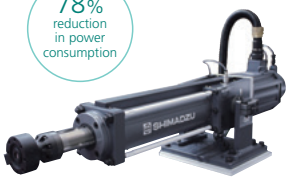
From 2016, also added to the list of "Eco-Labeled products" are products that produce great benefit to customers and achieve a significant reduction in environmental load as a result of improved product lifecycles due to less usage of consumables such as gas and reagents as well as due to smaller sized.



Examples of Eco-Labeled Products

* The figures are in comparison with our conventional models.

Integrated liquid chromatograph i-Series (Prominence-i, Nexera-i)



Electric motor driven actuator NJ-SERVO

General radiographic system RADspeed fit

Online total nitrogen/ phosphorus analyzer TNP-4200

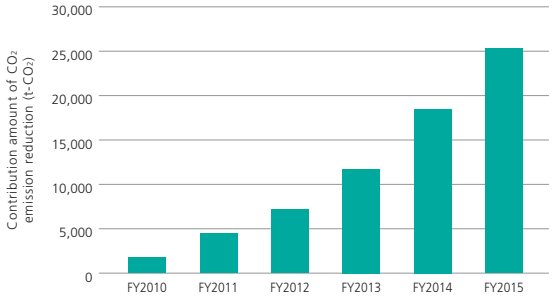
Development of Energy-Saving Products

In 2010, we launched the "Save the Energy Project" to promote the development of products with reduced power consumption. Our efforts through this project towards the reduction of power consumption of 25% or more compared with conventional models led to the development of 43 models of energy-saving products by 2015.

We define the effect of reduction in CO_2 emissions during use of the energy-saving product by customers as the "contribution amount of CO_2 emission reduction." This is equivalent to a reduction of more than 25,000 tons of CO_2 annually through the provision of energy-saving products to the market by 2015.

We will continuously proceed with the development of energy-saving products with an aim to contribute to a low-carbon society.

Contribution amount of CO_2 emission reduction by energy-saving products



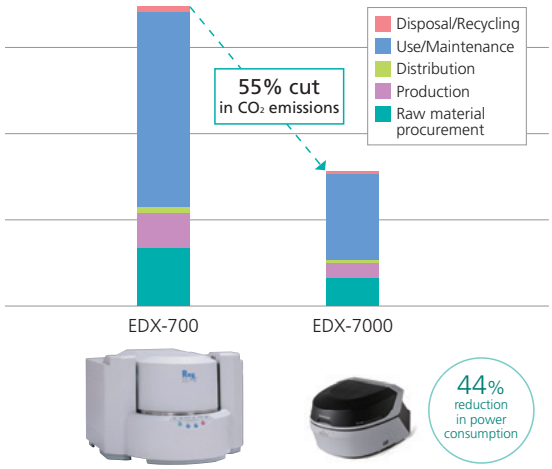
Evaluation of Products with LCA

Life Cycle Assessment (LCA) is a method to evaluate the environmental impact of products throughout a series of phases, from the mining of materials constituting products, to production, distribution, use, disposal and recycling.

Evaluation of the latest models of our energy dispersive X-ray fluorescence spectrometers (EDX), certified as Eco-Labeled products, found that in addition to 44% energy saving compared with conventional models, they require no liquid nitrogen and are small sized and lightweight, thus achieving a 55% reduction in CO_2 emissions.

We will continue the product evaluation using LCA and provide environment-conscious products with better environmental performance in the future.

Comparison of EDX's CO_2 emissions by LCA



Response to Regulations Concerning Chemical Substances Contained in Products

Starting from July 2014, the RoHS Directive*1 is applied to analytical and measuring instruments and medical systems, and Shimadzu has been supplying RoHS-compliant products to European countries. To guarantee compliance with the Directive, we procure materials based on the Green Procurement Standards, evaluate management conditions of the supply chain through on-the-spot inspections and conduct voluntary analysis of procured materials using analytical and measuring instruments. Moreover, we cooperate with our business partners through explanatory meetings and dialogues to maintain the quality of the supply chain as a whole. Further, in response to tightened enforcement of the RoHS Directive and REACH regulations*2, we are establishing a chemical substance content management system to identify and manage in detail chemical substances contained in products for further reduction of environmental load.

*1. RoHS: EU Directive on Restriction of Certain Hazardous Substances (2011/65/EU)
*2. The regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals, which came into force on June 1, 2007

For these efforts to be successful, "Green Procurement," which is to preferentially purchase materials with less environmental load, is essential, based on a better partnership with domestic and overseas suppliers. Shimadzu will build a good relationship through which both parties can grow and develop through transactions.

Visit our websites for details of the environmental friendliness of products
http://www.shimadzu.com/about/procurement/
http://www.shimadzu.com/about/csr/environmental.html

Global Environmental Conservation through Technological Development: Environmentally Beneficial Products

New World Opened Up by Biomimetics

It is approximately four billion years since the appearance of primitive forms of life on earth. Over these years of history, life on earth has evolved, going through climate changes and repeated battles for existence and selection.
In recent years, with extinctions of species increasing rapidly, the importance of conserving biodiversity has been emphasized. One of the reasons for that is the benefits these living things bring us.
We, as human beings, receive benefits such as the supply of food, fiber, wood and raw materials for medical products, the generation of oxygen and water, and even knowledge of manufacturing practices we can learn from the structures and functions of living things.
Shimadzu's technology is involved in such areas, which may bring innovative changes to our lives.

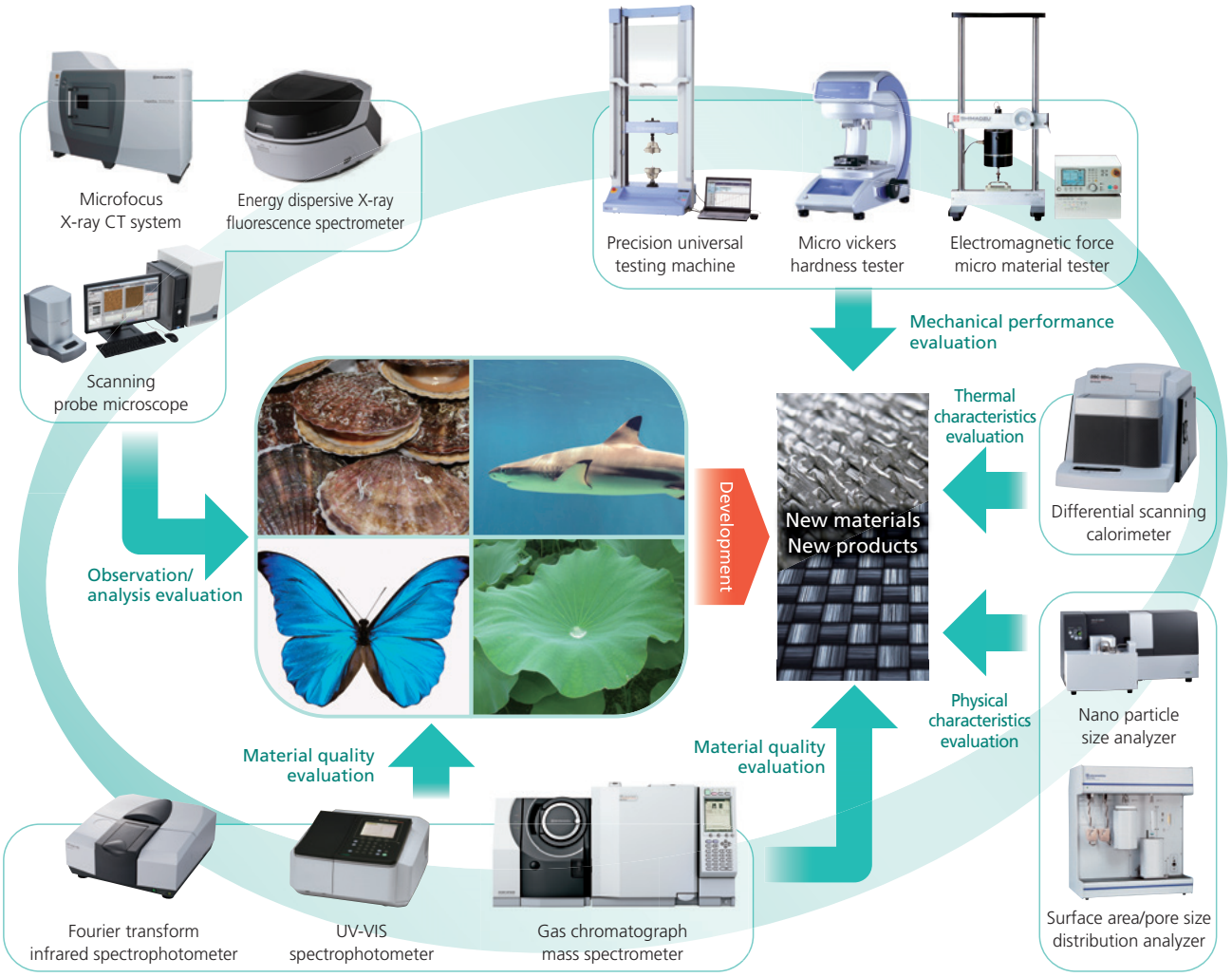
Expectation for Learning Manufacturing from Living Things

"Biomimetics" is also known as the technology of mimicking nature. Based on the concept that "There must be some reasons for the sustainability of living things that have been living for a long period from ancient times," biomimetics refers to a scientific technology to analyze their characteristics in detail and imitate their excellent structures and functions, production processes and even the ecosystems in which they live as a group, with the intention of putting it to use in the fields of new engineering technologies and manufacturing. Proposed by Dr. Otto Schmidt, an American neurophysiologist, in the late 1950s, biomimetics is said to have been coined by combining such as the words of "bio," "mime" and "mimic."
Since historical times, many familiar products have already been put into practical use, such as sponges made of synthetic resin produced by mimicking marine sponges. Other examples include super-water-repellent materials imitating the surface of lotus leaves, swimsuits for competitive swimming mimicking sharkskin, high-speed vehicles with the front imitating the beak of a kingfisher, and adhesive materials that mimic the hierarchical structure of a gecko foot. Although these techniques and products may seem ordinary nowadays, the developments have progressed while obtaining "awareness" from living organisms in natural environments.

Shimadzu Corporation and Biomimetics

While research and development using biomimetics has an extremely long history, Shimadzu has been engaged since 2014 in the development of evaluation and analysis methods using analytical and measuring instruments, receiving full support and gaining materials and knowledge about the latest research themes from the research group working under the scheme of Grant-in-Aid for Scientific Research in Innovative Areas, "Innovative materials technology based on biodiversity" by the Ministry of Education, Culture, Sports, Science and Technology. From 2015, we have been a corporate member of the Society of Polymer Science, Japan (SPSJ), conducting surveys on the needs concerning analysis and evaluation for new materials research. The survey results show that for a new material to be recognized as a final functional chemical material through research and development, it must go through a variety of tests at each stage of raw material evaluation, product evaluation and quality control. Shimadzu pushes forward the progress of research and

development and the practical use of biomimetics by providing a wide range of products and abundant methods of evaluation and analysis in the areas of material-quality evaluation, observation/analysis evaluation, physical characteristics evaluation and mechanical-performance evaluation.
In the meanwhile, environmental technology development based on biomimetics has been attracting attention, and knowledge about how to apply it to the development of renewable energies and energy-saving products has been accumulated. By establishing a sustainable society in harmony with nature through manufacturing with low environmental load, we will make every effort to maintain the rich ecosystem that can be a great source of inspiration for new materials and products.



Examples of analytical and measuring instruments used for research and development and practical application using biomimetics

Voice of a Stakeholder

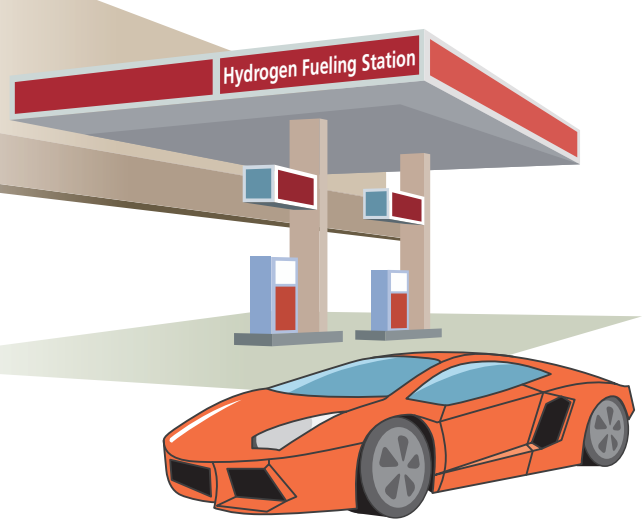
With the international standardization proposed by Germany in 2011 becoming effective, there has been an increasing interest in biomimetics from various industries, including materials, chemicals, machinery, automobiles, architecture and agriculture. This situation can be attributed to significant progress in analysis and evaluation techniques, mainly in nanotechnology, which is exactly what Shimadzu excels in.
In July 2016, "Biomim' expo 2016" was held in Senlis, France, by the French Ministry of Ecology, Sustainable Development and Energy, in cooperation with the Muséum national d'histoire naturelle and many companies. The keynote was centered on the firm recognition that biomimetics based on biodiversity is definitely a technological innovation that will contribute to sustainability.

Masatsugu Shimomura
Professor of the Department of Applied Chemistry and Bioscience,
Faculty of Science and Technology, Chitose Institute of Science and Technology

Global Environmental Conservation through Technological Development: Environmentally Beneficial Products

Measuring Technology Supporting the Development of Low-Carbon Mobility

Automobiles have taken root as people's means of transportation.
The number of automobiles is ever increasing, mainly in emerging countries, and some predict that this will more than double the current number to reach 165 million vehicles in 2030.
Currently, the energy for mobility such as automobiles comes mainly from fossil fuels, and thus, efforts are being made toward efficient use of these resources, while the development of new energy sources is continuing. Shimadzu provides new measuring devices used for the development of environmentally friendly mobility, supporting the growth of technological innovations toward a low-carbon society.



Towards the Realization of a Hydrogen Society

One of the big trends revolving around future mobility is the progress in research and development and the advances in infrastructure towards a hydrogen society based on fuel cells. Using the principle of reverse reaction of electrolysis of water, fuel cells generate energy from oxygen and hydrogen while only producing water as a byproduct. To spread this clean technology, Japan's Ministry of Economy, Trade and Industry released the "Strategic Road Map for Hydrogen and Fuel Cells," aiming to set up about 320 hydrogen stations nationwide by 2025 and increase the number of fuel cell vehicles to about 800,000 units in total by 2030.
The crucial element in research and development toward the spread of fuel cells is monitoring of the status of oxygen, the fuel of fuel cells. Through monitoring, it should be confirmed that the reactions taking place inside a fuel cell are smooth, and any problem or room for performance improvement should be identified, which will allow research and development for the optimization of power generation conditions.
In 2009, Shimadzu released the world's first fuel cell oxygen concentration visualization equipment "FC-O2 Monitor" based on the results of a project by the New Energy and Industrial Technology Development Organization (NEDO), in which Shimadzu participated from 2005 to 2007. Moreover, we joined a program by the Japan Science and Technology Agency (JST), with the University of Yamanashi as project leader, through which the "FC-3D Monitor" was newly developed and commercialized in 2016. The equipment can investigate the oxygen concentration inside a fuel cell in more detail and in real time, making it possible to design and select materials that enhance the power generation efficiency of a fuel cell, and examine optimizing the passage of oxygen and hydrogen.

FC-3D Monitor

Voice of a Developer

Fuel cell vehicles are the "ultimate eco-cars," emitting no carbon dioxide, and there are high expectations of them, not only from Japan but from around the world, as many different methods are available for the generation of hydrogen as an energy source. It is said that these vehicles will be actively used as a means of transporting spectators during the Tokyo Olympics to be held in 2020, and we expect to see a further acceleration in the spread of their use. Shimadzu has played a leading role in the area of measuring techniques for fuel cell development in cooperation with industry, government and the local community. We will continue our great contribution towards the realization of a hydrogen society as quickly as possible.

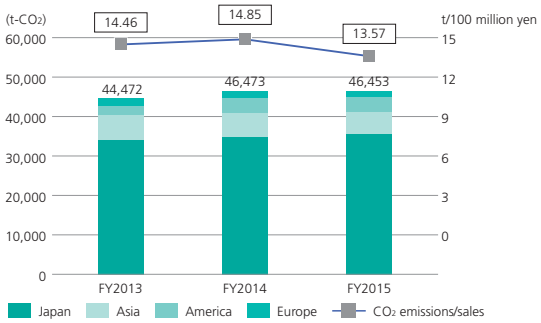
Takashi Ono
Manager of the Component Development Group
Sensor Device Business Unit, Device Department

Reduction of Environmental Load Caused by Business Activities

Global Warming Countermeasures

In terms of CO_2 emissions caused by the Shimadzu Group, it is confirmed that nearly 80 percent of the emissions are generated in Japan. For the year 2015, investment was made to transform the existing buildings into energy-saving buildings (heat-insulated exterior walls, heat-shielded roofs and others), replace aging transformers and switch from mercury lamps to LED lighting, leading to a reduction of about 170 tons of CO_2 emissions. This resulted in a slight decrease in CO_2 emissions from 2014, despite the increase in production volume, and an improvement in CO_2 emissions per consolidated sales.

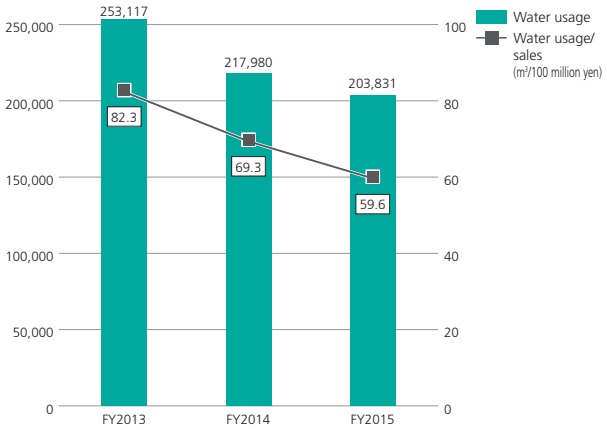
CO_2 emissions resulting from energy consumption by Shimadzu Group (Japan and overseas)



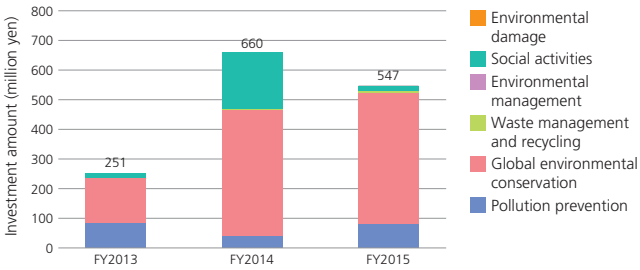
Water-Related Measures

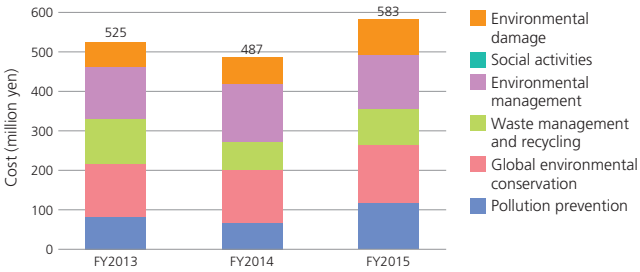
With water-saving measures such as changing heat sources for air conditioning facilities (from cooling towers to heat pumps), reuse of rainwater for green spaces and bathrooms, and the adoption of water-saving-type toilets, we succeeded in reducing water use by 6.7 percent in 2015 compared with 2014.
In addition, in processes handling chemical substances that contain ingredients that may cause water contamination, we conduct operations in accordance with rules and procedures designed to avoid flowing-water-contaminating substances, and have installed neutralizing facilities and wastewater treatment equipment.
Furthermore, wastewater from plants is controlled by setting voluntary management standards stricter than the Sewerage Act and local regulatory standards, contributing to good water circulation.

Changes in water usage in domestic production bases, research institutions and major affiliated production companies



Environmental Accounting (* Total number of sites in Japan with ISO 14001 certification)





Costs required for environmental conservation (2015)

(Unit: million yen)

Category	Investment	Cost
Pollution prevention cost	79	116
Global environmental conservation cost	444	148
Waste-management and recycling cost	5	91
Environmental management cost	0	135
Social activity cost	19	93
Environmental damage cost	0	0
Total	547	583

Environment-related R&D cost (FY2015)

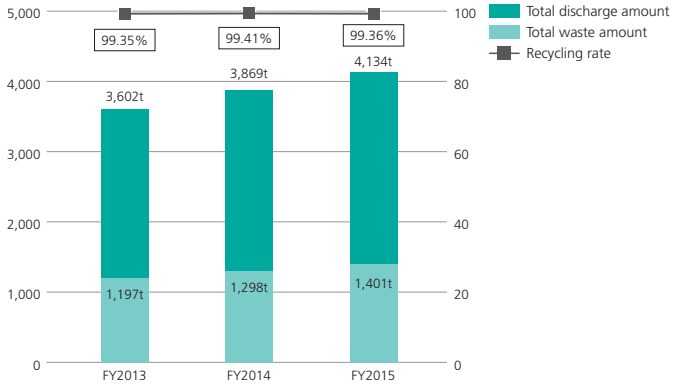
(Unit: million yen)

Category	Investment	Cost
R&D cost (Development of environment-related products and environmentally friendly products)	5	7,429
<Reference> Total R&D cost	—	14,135

Waste and Recycling Measures

Waste generated from each site is separated by type and then properly treated in accordance with applicable regulations. Due to increasing production volume and the effect of redevelopment work inside the property, the amount of waste has been on the rise for the past three years.
On the other hand, we place a priority on the recycling of discharged resources as valuables wherever possible, maintaining a recycling rate of 99 percent or more.
In addition, waste disposal service providers we use are periodically inspected according to the company regulations, and the expiration dates of permits are centrally managed throughout the company to ensure legal compliance.

Changes in waste discharge in domestic production bases, research institutions and major affiliated production companies

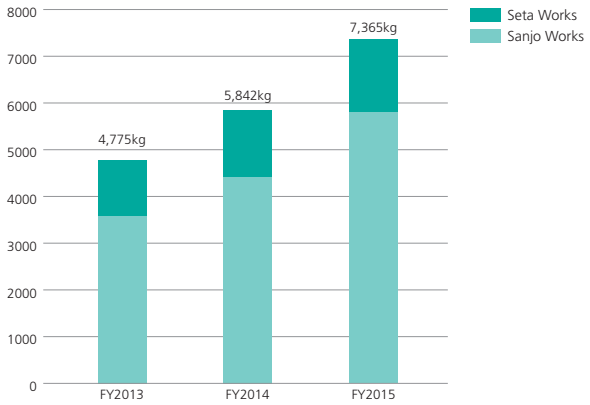


Chemical Substances Management

For various types of chemical substances used in business activities, we have established a company-wide management system for proper control of these substances from the viewpoint of business continuity planning (BCP). For daily management, the Chemical Registration Information system (CRIS) developed by Shimadzu System Development Corporation is used. The system manages the quantities at purchase, use and disposal stages, allowing the aggregation of inventory and usage amounts, and easy preparation of reports based on the PRTR Law in Japan*.
Furthermore, not limited to the department directly handling chemical substances, we provide education also for sales departments about the importance of managing permits and approvals, communicating daily operation procedures.
The amount of PRTR-reported substances used in 2015 increased from 2014, which is due to an increased amount of chemical substances used in cleaning and painting processes as a result of the expansion of production volume.

*PRTR : Pollutant Release and Transfer Register

Changes in usage of PRTR-reported substances
* Total amount in domestic production bases and research institutions [Unit: kg]



Plant and chemical substance name	Amount	Usage
Sanjo Works		
Toluene (300)	1,140kg	Paint, cleaning
Nickel and its compounds (309)	4,655kg	Plating
Seta Works		
Xylene (80)	1,570kg	Paint

Voice of a Stakeholder

Shizue Hattori
Professor of the Department of General Humanities, Faculty of Humanities
Kyoto Seika University

With the Paris Agreement concluded at the 21st meeting of the Conference of the Parties of the United Nations Framework Convention on Climate Change (COP21), it can be said that the world has started shifting from a low-carbon society to a "carbon-free society."
Now, the method of backcasting, which is to depict a vision (ideal future image) and set mid- and short-term goals based on that vision, is being required more than ever, and I will pay close attention to Shimadzu's efforts in the future, especially what goals are set and how activities are conducted. I believe that measures from the point of view of the value chain, including customers and suppliers, as well as business continuity planning (BCP) responding to the risk to energy supply, will also contribute to the reduction in CO_2 emissions.
I really hope that the spirit of Shimadzu, which has made a significant contribution to local communities for a long time, will continue to remain as it is for future generations.

Support for External Environmental Activities

We continuously implement external support activities for the purpose of improving the environmental response capability of external stakeholders, raising environmental awareness and making environmental contributions in regional communities.
For the year 2015, as many as 1,703 employees participated in these activities, providing support for various environmental activities on 72 occasions targeting 2,949 people around the country,

Educational Support

Many of our efforts include the holding of visiting lectures regarding the environment at educational institutions, acceptance of visitors to factories, cleanup activities in the areas surrounding our sites, and giving lectures at seminars. As one of our unique efforts, we have an environmental activity team consisting of female employees in Japan called "Eco-Club," which develops environmental teaching tools and provides visiting lectures regarding the environment to elementary schools and others.
In 2015, the Eco-Club received the Corporate Activity Award at the 13th Kyoto Environmental Award for its long-standing efforts.

Conservation of Biodiversity

In the "Shimadzu Forest," a space installed on the premises of the headquarters and Sanjo Works, we grow hollyhock plants used for the Aoi Festival (Hollyhock Flower Festival) which is held annually in Kyoto, in an attempt to pass down the existing ecosystem and traditional culture.
We are also involved in activities of the Kyoto Model Forest Association, and have designated an area of 52 hectares in Nantan City, Kyoto as the "Shimadzu Corporation Forest," continuing our forest preservation activities. In 2015, we planted and thinned trees, held nature observation programs and gave moss-ball-making classes, in which 251 employees and their families participated. In addition, we are engaged in cleanup activities in the areas surrounding our factories or sites, and are making efforts to conserve ecosystems around the globe, including in China and the Philippines.
Furthermore, for the 20 years starting from 1996, we have been continuously supporting the United Nations University's project "Monitoring and Management of POPs and PFCs in Asia," through the provision of the latest analytical and measuring instruments and support for investigation and research conducted by research institutions and researchers in other Asian countries.

Voice of a Stakeholder

Shigeru Matsutani
Honorary Curator of the Kyoto Prefectural Botanical Garden
Guest Professor at Kyoto Prefectural University

For the first time since the last visits in the autumn of 2011 and spring of 2012, I came to the "Shimadzu Corporation Forest" in Nantan City, Kyoto, and was greatly impressed with its transformation and beauty. Thanks to tree thinning, the artificial forest of Japanese cypresses has improved, with better space for airflow, bringing in sufficient sunlight.
What concerned me slightly, though, were the natural forests such as Prunus grayana, which are distributed over the lower stretches of the water catchment area. This was because, in contrast to the upper-layer trees covering the top, there were no lower-layer trees, which there should have been in the middle or lower layer of the forest.
Having said that, seeing youngsters practicing a rugby club in SHIMADZU drill so vigorously that their voices sounded as if trees were falling, I had a feeling that I can rely on future generations to take care of the forest.
The best part of this forest is that you can spend an enjoyable time there with your family.

After Hearing Opinions from Outside Parties

Hiroshi Fujino
Senior Managing Executive Officer of Shimadzu Corporation

Professor Shimomura, Professor Hattori and Professor Matsutani, thank you very much for your opinions about our environmental activities and for your continued support, and I greatly appreciate your valued comments about the three pillars of Shimadzu's environmental activities.
It is not too much to say that global warming and biodiversity are the two biggest global themes, representing major environmental issues. We have made various efforts so far, and yet we still think it important to draw up a future vision in the mid- and long-term and contribute through technological developments. Based on the opinions we have received, we will continue to strive in various ways by taking advantage of our strengths.

Editorial Policy

The Shimadzu Environmental Report 2016 was issued to provide more detailed information about the environmental activities of the Shimadzu Group, after the issuance of the Shimadzu Report combining the Annual Report and the Environmental and Social Report, which were previously issued separately. We position this report as a communication tool helping stakeholders understand the Shimadzu Group's environmental activities.
For further details, please visit the corresponding websites indicated in the report.

Visit our website for details http://www.shimadzu.com/about/csr/

Shimadzu Environmental and Social Activities SEARCH

Period and Scope

This report primarily describes results and information from activities in fiscal year 2015 (from April 1, 2015, to March 31, 2016).
At some points, it may also include information regarding activities in 2014 and preceding years.
The report applies to the Sanjo Works including the corporate headquarter offices, the Technology Research Laboratory (Keihanna), the Seta Works, the Murasakino Works, the Hadano Works, the Atsugi Works and affiliated companies. For quantitative information, the applicable scope is provided in the corresponding section.
Although this report was issued in October 2016, departments, job titles and other information related to the stakeholders and Shimadzu Group employees refer to those when the report was edited (July 2016).
The Report for 2017 is scheduled to be issued around the summer of 2017.

SHIMADZU

For further details about our environmental activities featured in the Environmental Report or our website, contact Shimadzu as follows

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Shimadzu Corporation Head Office and Factories & Related Offices received the above accreditations.

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VEGETABLE OIL INK

In the interest of environmental friendliness, this report is printed with vegetable oil on FSC-certified paper, sourced from responsibly managed forests.

FTSE4Good

Shimadzu's stock has been included in the FTSE4Good Index Series, due to being highly rated by SRI rating bodies.

Shimadzu has been accredited as a corporation actively promoting the development of next generations by the Kyoto Labour Bureau, based on the "Act on Advancement of Measures to Support Raising Next-Generation Children."

JHEP AAA

The "Shimadzu Forest" at the Sanjo Plant in the head office has obtained the highest possible AAA rating of the Japan Habitat Evaluation and Certification Program (JHEP).

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