

## Environment

# Environmental Management

## Basic Approach and Policy

The Olympus Group's environmental initiatives are founded on its Corporate Philosophy, the Olympus Global Code of Conduct and the Environmental Policy. The Olympus Global Code of Conduct sets out our policy on the environment and the actions required. The objectives are described with clarity and detail in the Environmental Policy.

Placing great importance on reducing environmental impact throughout value chain, we are actively working to improve the environmental performance of our products, facilities, and logistics processes.

### Environmental Policy

All our activities are based on our corporate philosophy, "Making people's lives healthier, safer and more fulfilling." Following this philosophy, the Olympus Group respects people's security and health and the natural mechanisms that realize this. We will contribute to the realization of a sustainable society and sound environment by working to make the environment and economy compatible in our business operations.

#### 1. Participation by All

Each employee enriches their understanding of environmental activities and each one of us will participate in the environmental activities conducted in consideration of the local features.

#### 2. Promotion of Environmental Management

We will maintain the environmental management system and mechanism on a global scale so that we can continuously improve our environmental activities.

#### 3. Compliance with Laws, Regulations, and Social Norms

We will fully comply with the laws and regulations, agreements with our stakeholders, and our voluntary standards in respect to the environment.

#### 4. Reduction of Environmental Impact

Toward the solution of environmental issues, prevention of pollution, sustainable resource use, climate change mitigation and adaptation, and protection of biodiversity, we will reduce environmental impact of our products, services and business activities.

#### 5. Development of Technologies to Foster Harmony with the Environment

We will develop the technologies that contribute to environmental protection and will make use of the results in our manufacturing processes, products and services.

#### 6. Attributing Importance to Environmental Communication

We will proactively dispatch information about our environmental activities within and outside Olympus to deepen mutual understanding with our stakeholders.

## Promotion Structure and Initiatives

The Olympus Group recognizes the need to address environmental issues throughout the entire value chain encompassing product development, procurement, manufacture, logistics, sales and repair. Based on this understanding, the Chief Executive Officer (CEO) who manages business operations for the entire Group and the Chief Administrative Officer (CAO) who controls management functions have been appointed top executive officers for the environment. The Human Resources Head who manages human resource development and general affairs, including matters related to the environment, health and safety (EHS) serves as the top management for environmental affairs for the entire Group. Under the leadership of the Human Resources Head, the EHS Division is responsible for developing an environmental policy for the entire Group, as well as planning and promoting environmental measures and monitoring environmental initiatives across the entire Group, including progress made in achieving energy reduction targets and implementing measures.

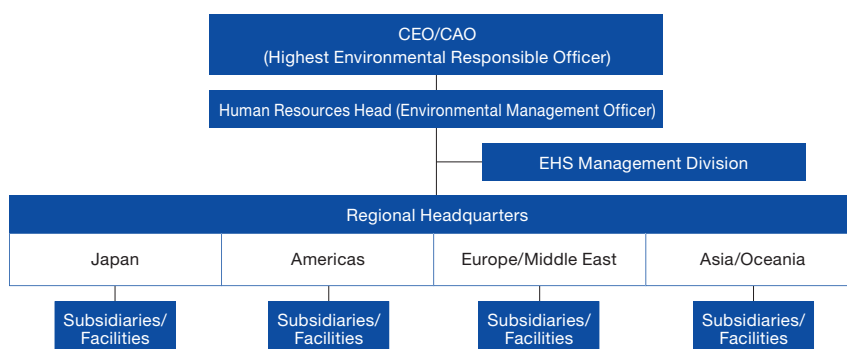
We have environmental management divisions for each business division and Group company. The EHS Division is responsible for environmental management for the entire Group. Since FY2015, the EHS Division has created an information platform for the entire Group to enable efficient gathering of information on environmental initiatives at various global sites that are essential to environmental management, as well as environment-related data and the status of these sites in complying with laws and regulations.

Moreover, our major production facilities, as well as logistics and sales subsidiaries around the world, have ISO 14001 certification, and we are continuously improving our environmental management system through audits and by other means. In FY2020, the six sites of the Olympus Corporation of the Americas, Olympus Surgical Technologies America Inc. and Gyrus ACMI Inc. acquired ISO 14001 certification after development of an environmental promotion structure and environmental management systems.

For further reinforcement of environmental governance and improved environmental management efficiency, the Olympus Group is promoting efforts to obtain ISO 14001 multi-site certification. In addition to the startup of a unified environmental management system for 12 subsidiaries in Japan and Asia, including the EHS division, we conducted environmental internal audits on environmental managers at each business site under the leadership of the EHS division, to maintain and improve the effectiveness of environmental supervision at each site, and obtained ISO14001 multi-site certification in August 2020. We aim to further expand ISO 14001 multi-site certification to global locations in order to promote rapid and accurate responses to environmental issues.

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## Environmental Management Structure



## List of ISO 14001 Certified Sites/Offices

(Name of sites and offices are  
as they were at time of the certification.)

\*1 The scope of certification includes the EHS division for Olympus Group and headquarters, and its medical business management functions.

\*2 The scope of certification includes the administrative functions at Sasazuka Facility in Tokyo and the customer support for the medical products.

\*3 It had been included in the scope of the ISO 14001 certification of Olympus Corporation until March, 2020.

\*4 It is included in the scope of the ISO 14001 multi-site certification of the Olympus Group.

Sites/Office		Date of Certification
Japan	Headquarters (Shinjuku)* <sup>1</sup>	August 2020
	Sasazuka Facility* <sup>2</sup>	August 2020
	Technology Research Center (Ishikawa)	March 2000
	Technology Research Center (Utsugi)	March 2000
	Technology Research Center (Takakura)	February 2018
	Nagano Facility (Tatsuno)	February 1998
	Nagano Facility (Ina)	May 2014
	Shirakawa Facility	October 1998
	Technology Research Center (Ishikawa)	March 2000* <sup>3</sup>
	Technology Research Center (Utsugi)	March 2000* <sup>3</sup>
	Hinode Plant	July 1998
	Nagano Olympus Co., Ltd.* <sup>4</sup>	February 1998
	Aizu Olympus Co., Ltd.* <sup>4</sup>	October 1998
	Shirakawa Olympus Co., Ltd.* <sup>4</sup>	October 1998
	Aomori Olympus Co., Ltd.* <sup>4</sup>	November 1998
	Olympus Terumo Biomaterials Corp.* <sup>4</sup>	Mishima Plant August 2020 R&D Center August 2020
	Olympus Logitex Co., Ltd.* <sup>4</sup>	Distribution Center in Sagami-hara November 2003
	Olympus Medical Science Sales Corp.* <sup>4</sup>	March 2004

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	Sites/Office	Date of Certification
Americas	Olympus Surgical Technologies America National Service Center	December 2005
	Olympus Scientific Solutions Americas Corp.	July 2010
	Olympus Scientific Solutions Technologies Inc.	July 2010
	Olympus NDT Canada Inc.	July 2010
	Olympus Corporation of the Americas • Center Valley Pennsylvania Regional Headquarters • Breinigsville Pennsylvania Distribution Center	September 2019
	Olympus Surgical Technologies America • Bartlett Tennessee Manufacturing Facility • Brooklyn Park Minnesota Manufacturing Facility • Norwalk Ohio Manufacturing Facility	September 2019
	Olympus Respiratory America • Redmond Washington Manufacturing Facility	September 2019
Europe/Middle East	Olympus Winter & Ibe GmbH	May 2001
	KeyMed (Medical & Industrial Equipment) Ltd.	March 2002
	KeyMed (Ireland) Ltd.	March 2002
	Algram Group Ltd.	January 2007
	Medical Physics International Limited	October 2012
	Olympus Iberia S.A.U.	September 2018
Asia Pacific	Olympus (GuangZhou) Industrial Co., Ltd.*4	October 2004
	Olympus Trading (Shanghai) Limited*4	February 2012
	Olympus Vietnam Co., Ltd.*4	April 2013
	Olympus Australia Pty Ltd	August 2017
	Olympus New Zealand Limited	August 2017

\*4 It is included in the scope of the ISO 14001 multi-site certification of the Olympus Group.

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## Major Environmental Activity Results in Fiscal 2020

	Primary Policy	Target	Measures	Achievements and Results in FY2020	FY2021 Target*
Promotion of environmental management	Enhancement of environmental governance system	Improve effectiveness and efficiency of the Environmental Management System	<ul style="list-style-type: none"> <li>Maintenance of ISO 14001 certification</li> </ul>	<ul style="list-style-type: none"> <li>New ISO 14001 certification of six business sites in the Americas</li> <li>Provided training for newly appointed environmental promotion officers in Japanese sites and Environmental Secretariat, and compliance training for the Environmental Secretariat (12 persons)</li> <li>Provided training for internal environmental audit leaders and auditors (35 persons)</li> </ul>	Ensure appropriate response to indicated points in internal environmental audit and ISO14001 certification audit
	Environmental risk reduction activities	Continue to improve the process to comply with environmental laws and regulations	<ul style="list-style-type: none"> <li>Activities aimed at ISO 14001 multi-site certification</li> <li>Enhance inspection for compliance status with environmental laws and regulations</li> </ul>	<ul style="list-style-type: none"> <li>Environmental internal audits of 10 sites in Japan and three sites in Asia</li> <li>On-site risk assessment for environment and safety in three sites in Japan</li> <li>Continue to improve the related internal rules for products and facilities</li> </ul>	Acquisition of ISO 14001 multi-site certification  Expand target sites for the Environmental/health and safety risk assessment Continue to improve the environmental regulatory compliance process for products and facilities
Environmental initiative throughout product life cycles	Product-related initiatives	Create Olympus Eco-Products	<ul style="list-style-type: none"> <li>Create products that are environmentally conscious and tailored to business characteristics</li> </ul>	<ul style="list-style-type: none"> <li>Created new Eco-Products in all business units (28 new, bringing total to 655)</li> </ul>	Continue to create products that are environmentally conscious and tailored to business characteristics
	Facilities-related initiatives	Energy consumption intensity: improve by 7.73% or more (compared to FY2013), by FY2021 Water use intensity: improve compared to FY2019 Emission recycling rate: improve compared to FY2019 Expand use of renewable energy	<ul style="list-style-type: none"> <li>Continue to implement improvements such as improving manufacturing processes, saving of energy and material resources and introduction of renewable energy, etc., in accordance to local characteristics</li> </ul>	<ul style="list-style-type: none"> <li>Energy consumption intensity: improve by 14.8%</li> <li>Water use intensity: improve by 1.4%</li> <li>Emission recycling rate: decrease by 2.8%</li> </ul>	CO <sub>2</sub> emission: reduce 15% compared to FY2018 Energy consumption intensity: improve 1% compared to FY2020 Renewable energy rate: more than 10% Emission intensity: improve 6% compared to FY2018 Water use intensity: improve by 6% compared to FY2018

\* The FY2021 targets for facility have been amended as follows as the Olympus Group increases its efforts to achieve a sustainable society.  
 Energy: The current energy consumption intensity target has been achieved by a wide margin. For accelerated action, new targets have been established such as the absolute CO<sub>2</sub> emission and renewable energy use rate.  
 Water & Emission: To achieve a reduction continuously over the long-term, the standard year has been established in setting targets.

## Systems and Mechanisms

### Environmental Risk Management

The Olympus Group identifies and evaluates business risks and opportunities when making its business strategy and business plans. These activities cover risks involved in transitions in regulations and technologies in the area of climate change and other environmental issues and physical risks due to natural disasters. Items that have been identified as risks or opportunities are assessed by their impact on our business and their probability of occurrence over the next five years. Those that will have a significant impact on business are managed in the business plans of each Olympus Group organization. To prepare for natural disasters such as floods and typhoons, business continuity plans have been developed and tested to ensure that they are viable and functional where necessary.

Olympus Group recognizes climate change, represented by the frequent extreme weather events and stronger demands from the international community prompted by the adoption of the Paris Agreement to prevent global warming, as a major environmental issue that affects our business activities. If the 2°C scenario (in which the rise in global average temperatures is to be less than 2°C above pre-industrial levels) and the 4°C scenario (in which the rise in global average temperatures is to be less than 4°C above pre-industrial levels) proposed by the International Energy Agency (IEA) is to be implemented in the future, the introduction of a carbon tax in various countries, reinforcement of CO<sub>2</sub> emissions regulations and a rise in the demand for products that contribute to reducing CO<sub>2</sub> emissions are expected to take place. It will become increasingly important to strengthen compliance with environmental laws and regulations and to develop energy conservation technologies.

	Environmental Changes	Risks	Opportunities	Measures
2°C scenario	Stronger regulatory action for a low carbon society	<Transition risks> · Increase in business costs due to carbon tax, carbon emissions trading and stronger regulatory action on CO <sub>2</sub> emission by various countries	· Evaluation by stakeholders	· Improvements in energy efficiency · Wider use of renewable energy · Diversification of suppliers · Environmentally conscious design in the product/service design & development stage
4°C scenario	Rise in temperature & increased extreme weather events	<Physical risks> · Supply chain disruption caused by growing scale of natural disasters, such as typhoons, floods, etc.		· Development and provision of products/services that contribute to resolving environmental issues in society

Chemical substances in products, violation of laws and regulations on effluent from manufacturing sites and contamination of soil and groundwater are serious environmental risks that affects our management in ways that include suspension of business operations, cost of restoring sites to their original state, decrease in corporate value, etc. For this reason, we are making efforts to reduce environmental risks by developing and maintaining internal rules adapted to statutory requirements, training environmental managers and related personnel and monitoring and improving on-site management.

In view of the great global interest in water risk, Olympus Group employs Aqueduct, a water risk evaluation tool from the World Resources Institute (WRI) and disaster prevention maps to evaluate physical water stress and regulatory risks that apply to the water resources for its key development and production sites to confirm that they are not located in high-risk regions. Although the impact on the business activities of Olympus Group is minimal, business sites are being set up in locations with abundant water resources, water consumption by our business activities is being reduced, managers are being appointed at our wastewater facilities and regular measurements are conducted on wastewater.

### Compliance with Environmental Laws and Regulations (FY2020)

There are no violations or incidents related to environmental laws and regulations excluding relatively minor violations in FY2020. Also, there are no claims, penalties and fines.

## Biodiversity Conservation

There is a concern that the loss of biodiversity will have a serious impact on the global environment and our lives.

The Olympus Group is working to conserve biodiversity, including the management of water use and wastewater and the maintenance of green spaces, through cleanup and forest conservation activities in areas surrounding its facilities.

## Green Procurement

Olympus published the “Olympus Group Green Procurement Standard” in 2001. The Green Procurement Standard, which is also posted on our website, explains the Olympus Group’s approach to its environmental activities to all suppliers.

In addition, in our corporate survey that we conduct once a year targeting major suppliers around the world with whom we have ongoing business, we verify whether the suppliers have acquired ISO 14001 certification, reduced CO<sub>2</sub> emissions, water use and waste, and what measures they have taken against chemical substances. In this way, we are working to raise the level of our environmental activities with suppliers.

## Environmental Education and Awareness Activities

The Olympus Group recognizes the importance of greater environmental awareness by each and every employee and full participation in environmental activities under the Olympus Group Environmental Policy. We are running more environmental awareness activities such as the Olympus Environment Month, a global group-wide event. In FY2020, an environmental e-learning program was conducted involving all Group employees, to promote group-wide awareness of important environmental issues, such as climate change and marine plastic pollution, and the state of environmental activities throughout the Group. In addition, environmental awareness events adapted to regional characteristics have been organized in various sites around the world.

We have also introduced special training programs to improve our environmental management system and implement it effectively. These include programs on compliance with environmental laws and regulations, and ISO 14001 internal audits at facilities around the world.

> Olympus Environment Month  
<https://www.olympus-global.com/csr/environment/2019/>

### Major Environmental Education Programs (Olympus and its Japan subsidiaries/FY2020)

Target	Purpose/Description	Number of Participants
Environmental managers	Understanding the responsibilities and roles of environmental managers (key points in compliance with environmental laws and regulations, and development of an effective EMS)	5
Environmental Secretariat staff at facilities	Training to improve skills for environmental officers (Understanding new developments in environmental laws and regulations, and practical application of the amended Act on Rational Use and Proper Management of Fluorocarbons, etc.)	13
Environmental audit leaders	Training to improve internal audit skills (Understanding key points in audit indications and improvement proposals, audit role playing, etc.)	13
Environmental auditors	Audit training based on ISO 14001 (Understanding the revisions to ISO 14001:2015, audit experience, etc.)	22



## Environment

## Environmental Performance

At the same time, we actively develop and market environmentally conscious products that contribute to resolving issues with climate change and water risk and products designed to resolve environmental issues.

## Initiatives

Resource and Energy Input		Business Activities	Discharge of Environmental Load Substances	
<b>Energy (total)</b> 272,570MWh (1%) ★ Electric power 163,015 MWh (0%)★ Gasoline 1 kl (-50%)★ City gas 3,958 thousand m³ (-4%)★ Hot water 1,855 GJ (17%)★ LPG 1,427 t (3%)★ District heat 2,000 MWh (0%)★ LNG 800 t (5%)★ Green electricity 20,651 MWh (25%)★ Heavy fuel oil 207 kl (3%)★ Solar power (internal) Kerosene 60 kl (0%)★ 533 MWh (-1%)★ Diesel fuel 60 kl (650%)★ Solar heat (internal) 481 GJ (5%)★		<b>Development and Manufacturing</b>	<b>Greenhouse Gases (Total)</b> 87,543 t-CO <sub>2</sub> e (-1%)★ CO <sub>2</sub> generated from energy 87,539 t-CO <sub>2</sub> e (-1%)★ CO <sub>2</sub> not generated from energy 4 t-CO <sub>2</sub> e (-33%)★	
<b>Chemical Substances (PRTR Substances Handled)</b> *Production sites in Japan only 42.5 t (9%)			<b>Substances Emitted</b> NOx 60 t (2%) SOx 0.3 t (0%)	
<b>Water (total)</b> 1,182 thousand m³ (-1%)★ Piped water 522 thousand m³ (1%)★ Ground water 660 thousand m³ (-2%)★			<b>Chemical Substances (PRTR substances emitted and transferred)</b> *Production sites in Japan only 19.3 t (3%)	
<b>Raw Materials and Sub-Materials</b> *Production sites in Japan only Metals····· Steel, aluminum, brass Plastics····· Optical plastics, ABS, PC, polyethylene, polypropylene		<b>Production</b>	<b>Discharge to Water Systems</b> 1,182 thousand m³ (-1%) Water discharged (public waters) 493 thousand m³ (-5%) Water discharged (sewage) 689 thousand m³ (2%) <b>BOD</b> 1 t (0%)	
<b>Office Supplies</b> Copy paper 212 t (0%)			<b>Discharge (total)</b> 7,000 t (5%)★ Amount recycled 5,390 t (1%)★ Other waste 1,610 t (19%)★ <b>Landfill</b> 107 t (7%)★ <b>Hazardous waste</b> 310 t (-2%)★	
<b>Transportation Fuel</b> Transportation····· Gasoline, diesel fuel, etc.			<b>CO<sub>2</sub> Emissions during Transportation (total)</b> 46,415 t-CO <sub>2</sub> e (-12%)★	
<b>Use of Packaging Materials (total)</b> 1,268 t (6%) Cardboard 734 t (8%) Paper 275 t (6%) Plastic 224 t (3%) Metal 0 t (-100%) Glass 0 t (0%) Other 35 t (0%)		<b>Sales and Logistics</b>	<b>Product Shipments</b>	
<b>Sales</b>			<b>Medical Business (Endoscopes)</b> 2,795 t (6%) Medical Business (Endoscopes) 1,408 t (-1%) Imaging Business (Digital cameras, Recorder) 543 t (8%) Scientific Solutions Business (Microscopes) 844 t (14%)	
<b>Repair and Service</b>				

Percentage change from previous year in brackets

## Energy/Atmospheric Release

### Internal (Scope 1, 2) Results

FY2020 Targets	FY2020 Results	Main Measures	FY2021 Targets
Energy consumption intensity: improve by <b>6.79% or more</b> (compared to FY2013)	Energy consumption intensity: improved by <b>14.8%</b> (compared to FY2013)  CO <sub>2</sub> emissions: reduced by <b>24.6%</b> (compared to FY2013)	<ul style="list-style-type: none"> <li>● Ongoing implementation of manufacturing improvement activities</li> <li>● Introduction of energy saving equipment</li> <li>● Ongoing implementation of energy-saving activities on a daily basis, including switching off lights and adjusting air-conditioning temperatures</li> <li>● Effective use of renewable energy</li> </ul>	CO <sub>2</sub> emissions: reduced by <b>15%</b> (compared to FY2018)  Energy consumption intensity: improve by <b>1%</b> (compared to FY2020)
Expand use of renewable energy	Amounts of renewable energy: <b>22,019 MWh</b> (improve by 23.5% compared to FY2019)		Renewable energy rate: <b>10% or more</b>

The Olympus Group set a target of improving its energy consumption intensity by 7.73% or more, compared with FY2012, by FY2020 and among its energy-reduction activities is engaged in reducing its CO<sub>2</sub> emissions. In FY2020, continual improvements in manufacturing, energy-saving measures and the use of renewable energy were introduced at sites around the world. At Hachioji Facility, the activities involved reducing energy transfer losses by relocating the steam boiler closer to the facility using the steam. At the Nagano Facility, more efficient air conditioning and heat source equipment were introduced and lighting was upgraded to LED lighting.

We have also focused our attention on the construction and renovation of facilities. At Olympus Europa SE & Co. KG and Olympus Winter & Ibe GmbH, facility construction and renovation are underway with German Sustainable Building Council certification (DGNB certification\*). For wider use of renewable energy, studies are focusing on the state of dissemination, economic feasibility and other factors in each country. During the current fiscal year, the renewable energy use rate at Gyrus ACMI, Inc., of the Americas increased from 18% to 36%. This led to an increase in renewable energy consumption in FY2020 over FY2019, with the renewable energy use rate vis-à-vis total electric power consumption rising to 11.8% (compared to 9.7% the previous year). In FY2021, we will implement further action to cut energy consumption with the addition of CO<sub>2</sub> emissions reduction targets.

\*DGNB certification: Environmental certification for architectural structures issued by the German Sustainable Building Council to reduce the environmental impact of structures. Certification is given after assessment of the environmental performance of the building and confirmation that the structure satisfies certain criteria.

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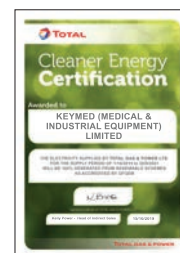
## Green Energy Certificates



Olympus Surgical Technologies America (Gyrus ACMI, Inc.) (U.S.A.)



Olympus Europa SE & Co. KG (Germany)

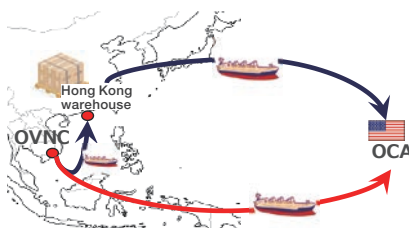


KeyMed (Medical & Industrial Equipment) Ltd. (U.K.)

## External (Scope 3 [Category 4 Upstream transportation and distribution]) Results

FY2020 Results	Main Measures
CO <sub>2</sub> emissions: reduced by <b>16.8%</b> (compared to FY2013)	<ul style="list-style-type: none"> <li>Enhanced loading efficiency by improving packaging size and strength</li> <li>Reduced transportation weights by improving packing and packaging methods</li> <li>Shortened lead times and transportation distances by improving logistics routes</li> </ul>

The Olympus Group is engaged in reducing logistics-related CO<sub>2</sub> emissions at each of its sites. We continued our modal shift in international transportation from aircraft to ships as improvements in logistics routes. In FY2020, greater efficiency was achieved in shipments with consolidation of storage of sales promotion goods in the Americas. Also, greater efficiency in the logistics route between mainland China and Hong Kong for a scientific instrument (Model CX 23 microscope) manufactured by Olympus (Guangzhou) Industrial Co., Ltd., and rerouting shipments of some medical products manufactured by Olympus Vietnam Co., Ltd. (OVNC) straight to Olympus Corporation of the Americas (OCA) rather than through its Hong Kong warehouse have resulted in reducing the distribution distance.



Rerouting of medical products shipments without any detour

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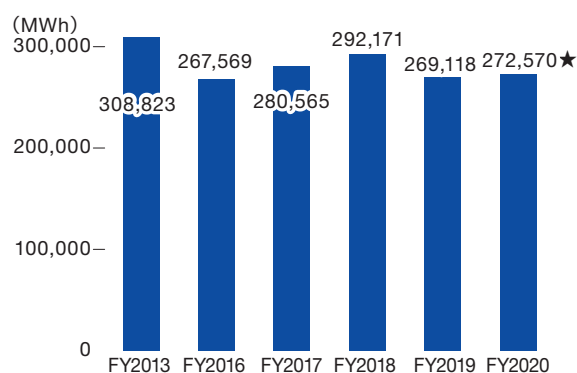
## Internal Energy Consumption

FY2020

**272,570** MWh

★ Indexes certified by external assurance.

\* Scope: The Olympus Group. However, small businesses are excluded. Conversion coefficient based on Enforcement Regulation for the Act on the Rational Use of Energy



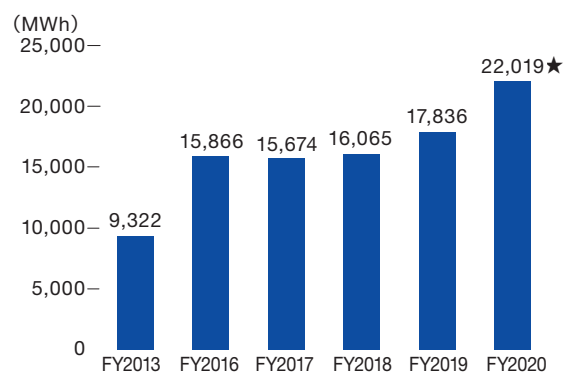
## Renewable Energy Consumption

FY2020

**22,019** MWh

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\* Scope: The Olympus Group. However, small businesses are excluded. Conversion coefficient based on Enforcement Regulation for the Act on the Rational Use of Energy  
 \* Renewable energy includes green electricity, solar power (internal) and solar heat (internal).



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## Breakdown of Internal Energy Consumption

(MWh)

		FY2013	FY2016	FY2017	FY2018	FY2019	FY2020
Direct	City gas	42,816	39,164	45,375	52,437	51,776	49,760★
	LPG	10,086	15,013	19,928	19,708	19,467	20,140★
	LNG	15,655	12,764	12,954	12,454	11,533	12,132★
	Heavy fuel oil	4,163	3,525	2,492	2,072	2,183	2,252★
	Kerosene	505	536	574	548	612	614★
	Diesel fuel	43,957	184	132	229	80	624★
	Gasoline	0	4	3	5	15	14★
Subtotal		117,182	71,190	81,458	87,453	85,666	85,536★
Indirect	Electricity	180,051	178,431	181,327	186,508	163,621	163,015★
	Hot water	324	519	687	682	597	701★
	District heat	2,268	2,082	2,106	2,145	1,995	2,000★
	Green electricity	8,700	14,990	14,423	14,763	16,576	20,651★
	Solar power (internal)	168	251	479	497	536	533★
	Solar heat (internal)	130	106	85	123	127	134★
Subtotal		191,641	196,379	199,107	204,718	183,452	187,034★
Total		308,823	267,569	280,565	292,171	269,118	272,570★

★: Indexes certified by external assurance.

## CO<sub>2</sub> Emissions/Basic Unit (Scope 1, 2)

FY2020

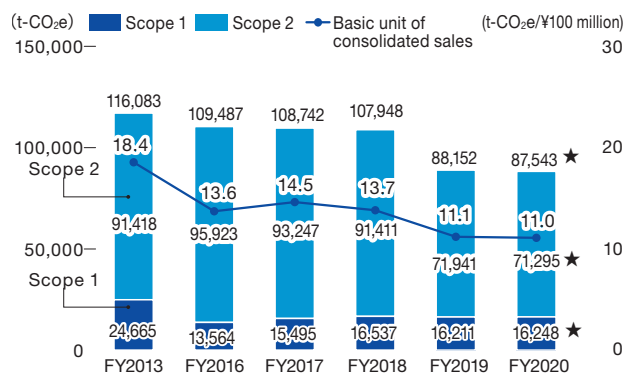
87,543 t-CO<sub>2</sub>e

★ Indexes certified by external assurance.

\* Scope: The Olympus Group. However, small businesses are excluded.

\* Reporting based on the following GHG Protocol scopes.  
Scope 1: Greenhouse gas emission from direct use of fossil fuels

Scope 2: Greenhouse gas emission from secondary use, such as electric power purchase



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## CO<sub>2</sub> Emissions (Scope 3 [Category 4 Upstream transportation and distribution])

FY2020

**46,415** t-CO<sub>2</sub>e

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### Sources for CO<sub>2</sub> Conversion Coefficients

#### ●Electricity

Japan: Coefficients published annually by the national government under the Act on Promotion of Global Warming Countermeasures and coefficients after adjustment for each power utility per fiscal year. FY2019 conversion coefficient used for FY2020.

Outside Japan: Utilized the data per country per year published by the International Energy Agency (IEA). FY2018 conversion data was used for the data after FY2019. For the U.S. and Canada, the data per state as published by the United States Environmental Protection Agency (EPA) and the United Nations Framework Convention on Climate Change (UNFCCC) was used.

\*The conversion coefficient is zero for electric power from purchased renewable energy and our own solar panels.

#### ●Fuels

Japan/outside Japan: Conversion coefficients based on Act on Promotion of Global Warming Countermeasures employed.

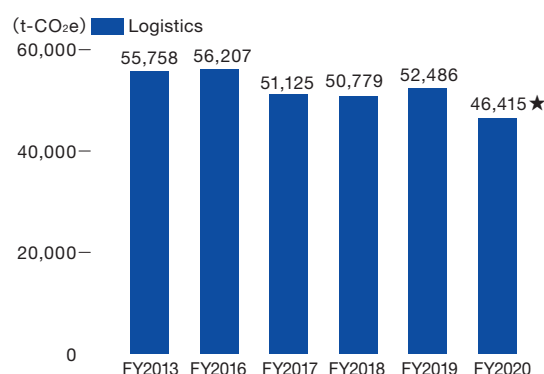
### Coefficients for Converting GHG to CO<sub>2</sub>e

From FY2015 onward:  
100-year GWP in IPCC Fourth Report used.

Up to and including FY2014:  
100-year GWP in IPCC Second Report used.

### Basic Unit of Consolidated Sales

Companywide CO<sub>2</sub> emission (t-CO<sub>2</sub>e) / Consolidated sales (100 million yen)



## CO<sub>2</sub> Emissions for the Entire Supply Chain

Category		CO <sub>2</sub> Emissions (t-CO <sub>2</sub> e)		Calculation Method (Assumptions)
		FY2019	FY2020	
Scope 1		16,211	16,248★	
Scope 2	Market-based method	71,941	71,295★	
	Location-based method*	77,431	78,660★	
Scope 3	1. Purchased goods and services	83,019	75,040	Calculated by multiplying raw materials and parts of leading products by basic unit
	2. Capital goods	199,918	184,026★	Calculated by multiplying facility investment value by basic unit
	3. Fuel- and energy-related activities (not included in Scope 1, Scope 2)	5,029	4,995★	Calculated by multiplying electric power and fuel purchased by basic unit
	4. Upstream transportation and distribution	52,486	46,415★	Calculated by multiplying transport ton/kg of leading products by basic unit (including delivery logistics)
	5. Waste generated in operations	5,063	5,398★	Calculated by multiplying worksite waste output by basic unit
	6. Business travel	19,588	16,601★	Calculated by multiplying business travel expenses by basic unit
	7. Employees' commuting	13,811	13,867★	Standard commute model defined by region and calculated by multiplying the number of employees in region by basic unit
	8. Leased assets (upstream)	14,116	13,448★	Calculated by multiplying gasoline consumption for corporate & leased vehicles by basic unit
	9. Downstream transportation and distribution	—	—	Classified as transport from dealers and sales companies to the customer but excluded due to small impact scale
	10. Processing of sold products	—	—	Excluded due to small impact scale and difficulty in tabulation in this category
	11. Use of sold products	93,398	80,738	Calculated by multiplying electric power consumption, etc., for lifetime of sold product by basic unit
	12. End-of-life treatment of sold products	2,057	2,889★	Calculated by multiplying product disposal weight by basic unit for waste material
	13. Leased assets (downstream)	—	—	Calculation including use of sold products, although some products are leased
	14. Franchises	—	—	Not calculated due to absence from Olympus's business range
	15. Investments	3,971	1,575★	Calculated by multiplying Scope 1 & Scope 2 emissions at investment targets by investment ratio

Scope 1: Direct emissions from facilities owned or controlled by the company (e.g., emission from use of town gas or heavy oil)

Scope 2: Emission from generation of energy consumed at facilities owned and controlled by the company

\* CO<sub>2</sub> conversion coefficient used in calculating the location standard

Japan: Conversion coefficient for FY2019 is based on the national average coefficient announced annually by the Japanese government, under the Act on Promotion of Global Warming Countermeasures.

Overseas: The FY2018 conversion coefficient is based on the coefficient published by the International Energy Agency (IEA).

Scope 3: Other indirect emissions excluding Scope 1 and Scope 2

★: Obtained external assurance (Page 111-112) for total CO<sub>2</sub> emissions in Scope 1 and Scope 2, and assurance for Category 2-8, 12, 15 in Scope 3.

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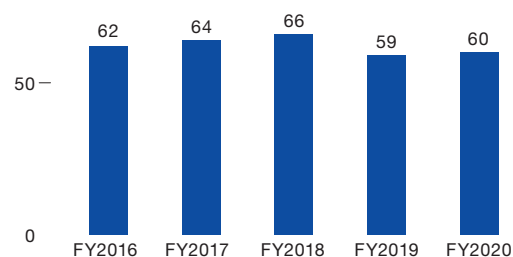
## NOx Emissions

FY2020

60<sub>t</sub>

(t)

100 —



\* Scope: The Olympus Group.  
However, small businesses are excluded.

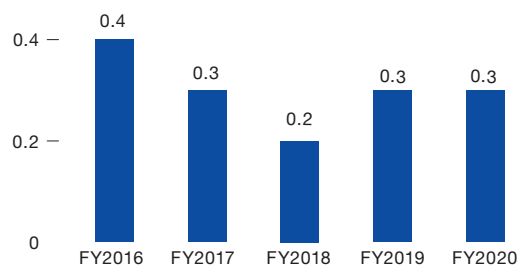
## SOx Emissions

FY2020

0.3<sub>t</sub>

(t)

0.6 —



\* Scope: The Olympus Group.  
However, small businesses are excluded.



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## Water/Emission

### Water Use/Wastewater Results

FY2020 Targets	FY2020 Results	Main Measures	FY2021 Targets
Water use intensity: improve by <b>1%</b> compared to FY2019	Water use intensity: improved by <b>1.4%</b> (compared to FY2019)	<ul style="list-style-type: none"> <li>● Improvements in water use processes</li> <li>● Implementation of anti-leak measures during equipment inspections</li> </ul>	Water use intensity: improve by <b>6%</b> compared to FY2018

The Olympus Group uses water mainly in production processes, such as for cleaning components and cooling, as well as in its dining halls. We implement thorough wastewater control by adopting stricter standards than the legal requirements in each region, and we continue to reduce water consumption and wastewater emissions by setting targets in those sites that have high water consumption.

In Japan, the cooling water used for solvent washers at the Nagano Facility has been used to wash components since FY2020. At Aizu Olympus, water consumption is being reduced with shorter washing times under running water and by the introduction of ultrasonic washers. The accuracy with which groundwater use is being measured at the Hachioji Facility (Ishikawa & Utsugi), Nagano Facility (Tatsuno) and Aizu Olympus has been improved by updating the measuring instruments. At the same time, the amount of groundwater pumped is measured and facilities are inspected daily to ensure that water consumption and its impact on the local environment are monitored in detail. In the Americas, Olympus Surgical Technologies America (Gyrus ACMI, Inc.) was recognized for its compliance with the industrial wastewater control program required by King County in the state of Washington and was awarded the Gold Prize for Commitment to Compliance.

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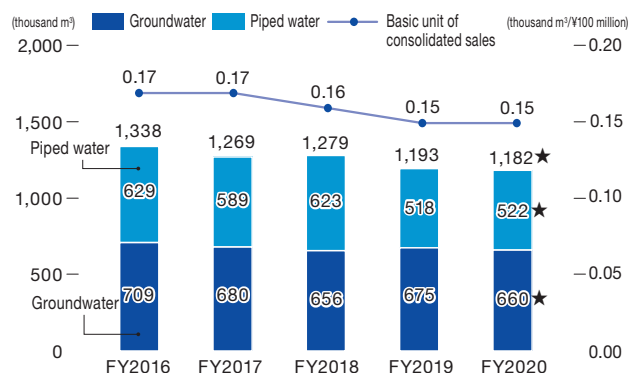
## Water Use

FY2020

**1,182** thousand m<sup>3</sup>

★ Indexes certified by external assurance.

\* Scope: The Olympus Group. However, small businesses are excluded.

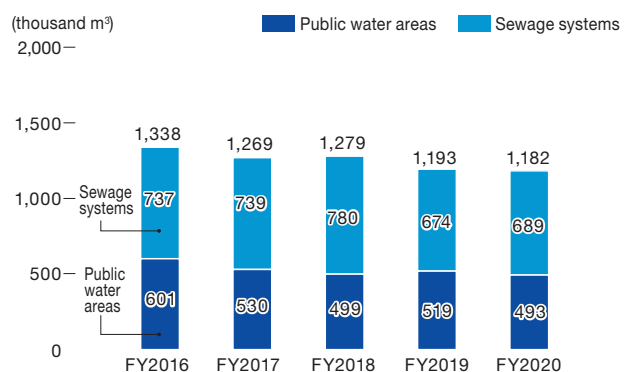


## Wastewater

FY2020

**1,182** thousand m<sup>3</sup>

\* Scope: The Olympus Group. However, small businesses are excluded.



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## Emission Results

FY2020 Targets	FY2020 Results	Main Measures	FY2021 Targets
Emission recycling rate: improve compared to FY2019	Emission recycling rate: Less than <b>2.8%</b>	<ul style="list-style-type: none"> <li>● Reduction of process defects</li> <li>● Promotion of recycling by thorough separation</li> <li>● Promotion of reusing package materials</li> <li>● Use of biodegradable plastics</li> </ul>	Emission intensity: improve by <b>6%</b> compared to FY2018

The Olympus Group is working continually on reducing losses in manufacturing processes by making improvements to them and efficient use of resources, including thorough waste separation to reduce waste discharge, extract valuable materials and promote recycling.

In FY2020, Olympus Logitex replaced the disposable stretch film used to prevent load shifting with recyclable packaging bands to reduce packaging material waste. In addition, returnable containers are increasingly being used and cushioning materials are being reused. Olympus Shirakawa Facility has made its use of resources more efficient by extracting valuable materials from used organic solvents and facilities. In addition, safe chemical alternatives are being introduced at various facilities, resulting in a lower hazardous waste discharge compared with FY2019. However, the waste recycling rate was only reduced marginally over FY2019 due to the increase in the total waste discharge resulting from the increased production at facilities outside Japan. However, the various sites are continually working to comprehensively separate their waste to improve their recycling rates. At Olympus Corporation of the Americas, use of plastic dishes and straws was discontinued at employee dining halls, and the internal social network are used to raise employee awareness to introduce more comprehensive recycling.

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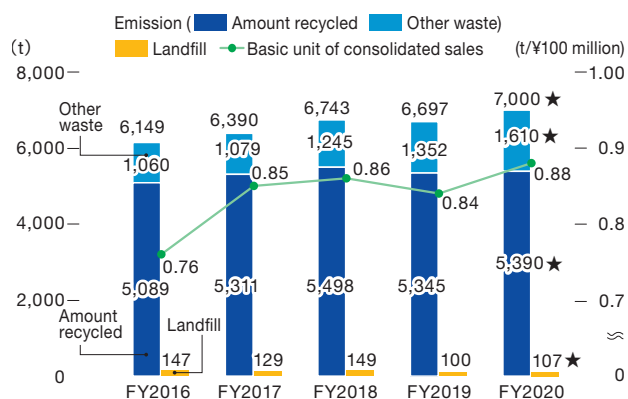
## Emission/Landfill

FY2020 (Emission)  
**7,000** t

FY2020 (Landfill)  
**107** t

★ Indexes certified by external assurance.

\* Scope: The Olympus Group. However, small businesses are excluded.

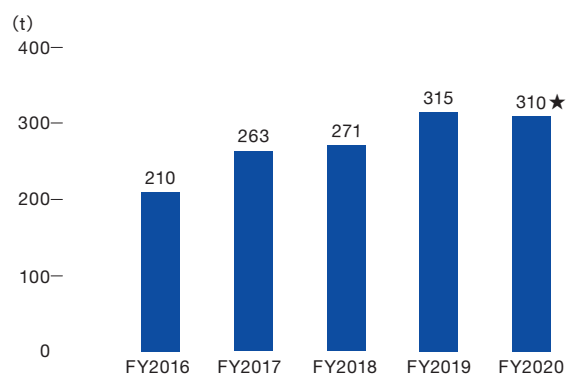


## Hazardous waste discharged

FY2020  
**310** t

★ Indexes certified by external assurance.

\* Scope: The Olympus Group. However, small businesses are excluded.



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## Chemical Substance Safety and Control

FY2020 Results	Main Measures
Emissions and Movements of PRTR Class 1-Designated Chemical Substances: decreased by <b>6.8%</b> (compared to FY2013)	<ul style="list-style-type: none"> <li>● Substitution of PRTR-designated chemicals with other substances through material developments</li> <li>● Reduced usage of PRTR-designated chemical substances</li> </ul>

The Olympus Group is striving for appropriate management and emissions reduction of chemical substances subject to the PRTR regulations in order to minimize the impact on people and the environment. In FY2020 there was an increase in the volume of PRTR substances emitted and transferred due to a rise in usage volume of organic solvents etc. caused by an increase in production. However, Nagano Facility has reduced the use of 1-bromopropane as a cleaning agent through improvements to the component cleaning process. Chemical substance management has been consolidated and a new chemical substance management system introduced at Hachioji Facility, resulting in dramatic improvements in the chemical substance management efficiency.

## Emissions and Movements of PRTR Class 1-Designated Chemical Substances

FY2020

**19.3<sub>t</sub>**

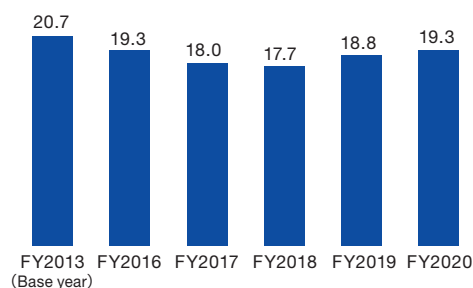
(t)

30—

20—

10—

0



\*Scope: Manufacturing and development sites in Japan

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## Olympus Group Site Data (FY 2020)

	Company/Facility		Location	CO <sub>2</sub> emissions (t-CO <sub>2</sub> e)	Water used (thousand m <sup>3</sup> )	Emission (t)	Amount recycled (t)
Japan	Olympus Corporation	Technology Development Center, Ishikawa Facility	Hachioji-shi, Tokyo	8,648	106	398	398
		Technology Development Center, Utsugi Facility	Hachioji-shi, Tokyo	2,945	28	287	287
		Technology Development Center, Takakura Facility	Hachioji-shi, Tokyo	375	5	14	14
		Nagano Facility Tatsuno	Tatsuno-machi, Kamiina-gun, Nagano	17,480	365	570	563
		Nagano Facility Ina	Ina-shi, Nagano	2,091	16	91	83
	Olympus Medical Systems Corp.	Hinode Plant	Hinode-cho, Nishitama-gun, Tokyo	1,318	6	47	47
	Aizu Olympus Co., Ltd.		Aizu-Wakamatsu-shi, Fukushima	13,877	192	487	450
	Aomori Olympus Co., Ltd.		Kuroishi-shi, Aomori	4,452	37	265	265
	Shirakawa Olympus Co., Ltd.		Nishigo-mura, Nishishirakawa-gun, Fukushima	3,917	41	414	337
	Olympus Terumo Biomaterials Corp.	Mishima Plant	Nagaizumi-cho, Suntogun, Shizuoka	1,412	8	10	8
		Research and development Center	Nagaizumi-cho, Suntogun, Shizuoka	23	0.02	1	1
	Olympus RMS Corporation		Hachioji-shi, Tokyo	33	0.03	0.7	0.7
	Olympus Logitex Co., Ltd.		Sagamihara-shi, Kanagawa	634		393	393
Americas	Olympus Corporation of the Americas		Pennsylvania, U.S.A.	4,309	16	490	490
	Olympus Scientific Solutions Americas Corp.		Massachusetts, U.S.A.	1,071	22	242	81
	Olympus Surgical Technologies America	Gyrus ACMI, Inc.	Massachusetts, U.S.A.	4,577	18	641	282
		National Service Center	California, U.S.A.	601	15	251	251
Europe/ Middle East	Olympus Winter & Ibe GmbH		Hamburg, Germany	571	15	345	345
	Olympus Medical Products Czech spol s.r.o.		Olomouc, Czech Republic	703	1	18	0
	KeyMed (Medical & Industrial Equipment) Ltd.		Essex, U.K.	859	24	384	303
	Algram Group Ltd.		Devon, U.K.	42	2	107	75
Asia/Oceania	Olympus (GuangZhou) Industrial Co., Ltd		Guangzhou, China	319	3	111	107
	Olympus Trading (Shanghai) Limited		Shanghai, China	244	1	10	5
	Olympus Vietnam Co., Ltd.		Dong Nai Province, Vietnam	13,341	223	1,174	454
	Olympus Australia Pty Ltd		Victoria, Australia	343	2	61	32

\* Olympus Group's production sites around the world

## Product Life Cycle Assessments

The Olympus Group works to develop products and production technologies that show consideration for safety and for the environment. Having in FY2004 established its Eco-Products Administration Rules, a voluntary standard relating to the environmental considerations of our products, we continue to certify our products as Olympus Eco-Products.

In addition, a life cycle assessment (LCA) is performed at each stage of a product's life cycle to assess its impact on the environment at the product development stage and from procurement through manufacture, distribution, use and final disposal. Clarifying the environmentally conscious aspects that differ for each product, we have set them as items for the environmental consideration standard.

## Examples of Environmentally Conscious Products

The Olympus Group works to show consideration for the environment through the products in each of its business fields.

### Medical Business

#### • Endoscopy System EVIS X1

##### <Main Product Features>

1. EVIS X1 supports accurate screening and confident diagnosis through introducing new and easy-to-use technologies as follows.
  - (1) EDOF: Extended Depth of Field
  - (2) RDI: Red Dichromatic Imaging
  - (3) TXI: Texture and Color Enhancement Imaging
  - (4) NBI: Narrow Band Imaging

##### <Environmentally Conscious Aspects>

- Reduction in product weight, reduction in energy consumption and longer life span of light sources.



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## Scientific Solutions Business

- Slim LED Transmitted Light Illumination Base for SZX2 and SZ2 Series Stereo Microscopes and the MVX10 Fluorescence Microscope

### <Main Product Features>

1. Cartridge-type slim LED transmitted light illumination base brings satisfaction to a wide range of observation methods with a single microscopy system.

### <Environmentally Conscious Aspects>

Maintenance free for the entire product life.





## Imaging Business

### • Interchangeable Lens Camera OLYMPUS OM-D E-M1 Mark III

#### <Main Product Features>

1. The world's best 7.5 shutter speed steps\*1 of compensation and new image processing engine TruePic IX achieve high image quality in a compact, lightweight body
2. Dustproof, splashproof, freezeproof design offers absolute reliability in harsh environments
3. High-speed, high-precision AF systems such as the new Starry Sky AF and Advanced Face Priority / Eye Priority AF



\*1 Among interchangeable lens cameras on the market as of February 12, 2020.

### • IC Recorder Voice-Trek VP-20

#### <Main Product Features>

1. Slim IC recorder equipped with "Recording Scene Select" settings for the recording environment enables recording from a pocket or a bag.
2. Omnidirectional stereo microphone that captures audio from all directions and "Anti-Rustle Filter."
3. "One-Touch Recording" to instantly start recording and self-timer feature.



#### <Environmentally Conscious Aspects> (shared by both products)

- In accordance with the "Act on Promotion of Recycling of Small Waste Electrical and Electronic Equipment"\*1 and the guidelines formulated by the Camera & Imaging Products Association (CIPA)\*2, battery recycling is encouraged by having not incorporated the batteries into the device bodies and by having adopted a rechargeable battery and a retractable battery compartment cover to facilitate battery removal.
- Reduced power consumption when in use and when on standby

\*1 Act on Promotion of Recycling of Small Waste Electrical and Electronic Equipment (Ministry of the Environment)  
<http://www.env.go.jp/recycle/recycling/raremetals/law.html> (Only in Japanese)

\*2 Assessment Guide for Easy Removable of Secondary Battery for Digital Cameras ver. 1.0 (Camera & Imaging Products Association)  
[http://www.cipa.jp/env/documents/j/assessmentguide\\_20160419.pdf](http://www.cipa.jp/env/documents/j/assessmentguide_20160419.pdf) (Only in Japanese)

## Products that Contribute to Solving Environmental Issues

Utilized even at the forefront of automobile and aircraft development with the aim of improving the efficient use of energy and the recycling facilities, Olympus products contribute to solving environmental issues.



### • X-ray Fluorescence (XRF) Analyzers

Assisting in hazardous substance analysis and resource recycling.

#### < Main Product Features >

1. Nondestructive measurement of substances (elements) in the target object by type and content.
2. Durability and toughness for use under rigorous conditions.
3. Use for quality inspections at production sites, selecting recycled raw materials, inspecting hazardous metals, etc.

### • Industrial Videoscope

Contributing to the realization of a society that emits only small amounts of CO<sub>2</sub>.

#### < Main Product Features >

1. Used in the inspection and diagnosis of the internal parts of machinery.
2. Reproduces even the slightest defect in a sharp, clear image.
3. Used for inspections of wind power generation facilities and of automobiles competing on low fuel consumption as well as of aircraft engines.



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## Recycling Small Rechargeable Batteries, Containers and Packaging Materials

Under the Act on the Promotion of Effective Utilization of Resources and as a member of the Japan Portable Rechargeable Battery Recycling Center (JBRC), Olympus is cooperating in collecting and recycling small rechargeable batteries. Containers for individual packaging and packaging materials used for products are being identified to allow sorted collection. Under the Act on the Promotion of Sorted Garbage Collection and Recycling of Containers and Packaging and as a member of the Japan Containers and Packaging Recycling Association, Olympus is also cooperating in recycling. At the same time, we are making efforts to promote effective use of resources to cut down the volume of container and packaging materials used.

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## Environmental Conservation Costs

(Millions of yen)

Grouping		FY2018		FY2019		FY2020	
		Investment	Cost	Investment	Cost	Investment	Cost
Costs inside Business Area		184	263	104	236	292	376
Content	Prevention of Public Nuisance Cost	24	119	31	113	22	184
	Global Environmental Conservation Cost	144	8	73	3	240	40
	Resource Circulation Cost	16	136	0	120	30	152
In Upstream Costs		0	64	0	109	0	149
In Downstream Costs		0	3	0	5	0	1
Environmental Management Activity Costs		0	342	0	355	0	345
R&D Costs		0	695	0	468	0	62
Costs of Social Activities		0	6	0	6	0	1
Costs for Damaged Environment		0	0	0	0	0	0
Total		184	1,373	104	1,179	292	934

## Environmental Conservation Effects

Quantitative Effects of Environment Preservation		FY2018	FY2019	FY2020
Effects Inside Business Area	CO <sub>2</sub> Emissions (t-CO <sub>2</sub> e)	55,092	56,761	57,206
	Waste Discharged (t)	2,633	2,827	2,977
	Water Usage (1,000 m <sup>3</sup> )	783	819	804
	Chemical Substances Transferred/Discharged (t)	18	19	19

(Millions of yen)

Economic Benefits of Environmental Protection		Change from Previous Fiscal Year
Revenue Benefits	Revenues from Sales of Valuable Recycled Substances	-1
Cost Savings	Energy Costs	18
	Costs of Water Usage	5
	Disposal Contracting Costs	0

Target period: April 1, 2017–March 31, 2020

Scope: Head office functions, manufacturing companies and distribution companies in Japan

Notes:

1) Tabulation based on "Environmental Accounting Guideline 2005."

2) Cost and depreciation that cannot be separated clearly in environmental management are not divided proportionately.

Full amount has been excluded from the calculations.

# Independent Assurance Statement Related to Environmental Data

## Independent Assurance Statement Related to Environmental Data (1/2)



### LR Independent Assurance Statement Relating to Olympus Corporation's Environmental Data within its CSR Data Book 2020 for the fiscal year 2019

This Assurance Statement has been prepared for Olympus Corporation in accordance with our contract but is intended for the readers of this report.

#### Terms of engagement

Lloyd's Register Quality Assurance Limited (LR) was commissioned by Olympus Corporation ("the Company") to provide independent assurance on its environmental data within its CSR Data Book 2020 ("the report") for the fiscal year 2019, that is, from 1 April 2019 to 31 March 2020, against the assurance criteria below to a limited level of assurance and at the materiality of the professional judgement of the verifier using ISAE 3000 and ISO 14064 - 3 for greenhouse gas ("GHG") data.

Our assurance engagement covered the Company's and its consolidated subsidiaries' operations and activities in Japan and overseas and specifically the following requirements:

- Verifying conformance with the Company's reporting methodologies
- Evaluating the accuracy and reliability of data for the selected indicators listed below: <sup>1</sup>

#### GHG Emissions <sup>2</sup>

- Energy consumption <sup>3</sup> (MWh equivalent)
- Scope 1 GHG emissions (tonnes CO<sub>2</sub>e)
- Scope 2 GHG emissions (Location-based and Market-based) (tonnes CO<sub>2</sub>)
- Scope 3 GHG emissions (Category 2-8, 12, 15) (tonnes CO<sub>2</sub>e)

#### Other environmental data

- Water consumption volume <sup>3</sup> (m<sup>3</sup>)
- Waste generated (tonnes) <sup>3</sup>

Our assurance engagement excluded the data and information of the Company's suppliers, contractors and any third-parties mentioned in the report.

LR's responsibility is only to the Company. LR disclaims any liability or responsibility to others as explained in the end footnote. The Company's responsibility is for collecting, aggregating, analysing and presenting all the data and information within the report and for maintaining effective internal controls over the systems from which the report is derived. Ultimately, the report has been approved by, and remains the responsibility of the Company.

#### LR's Opinion

Based on LR's approach nothing has come to our attention that would cause us to believe that Company has not, in all material respects:

- Met the requirements above
- Disclosed accurate and reliable GHG emissions and other environmental data

The opinion expressed is formed on the basis of a limited level of assurance and at the materiality of the professional judgement of the verifier.

**Note:** The extent of evidence-gathering for a limited assurance engagement is less than for a reasonable assurance engagement. Limited assurance engagements focus on aggregated data rather than physically checking source data at sites. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed.

<sup>1</sup> LR undertook a limited assurance engagement of the environmental data marked with ★ within the CSR Data Book 2020.

<sup>2</sup> GHG quantification is subject to inherent uncertainty.

<sup>3</sup> The scope is covered the breakdown of each selected indicators.

## Independent Assurance Statement Related to Environmental Data (2/2)



### LR's approach

LR's assurance engagements are carried out in accordance with ISAE 3000 and ISO 14064 – 3 for GHG data. The following tasks though were undertaken as part of the evidence gathering process for this assurance engagement:

- Auditing the Company's data management systems to confirm that there were no significant errors, omissions or mis-statements in the report. We did this by reviewing the effectiveness of data handling procedures, instructions and systems, including those for internal verification;
- Interviewing with key people responsible for compiling the data and drafting the report;
- Sampling datasets and tracing activity data back to aggregated levels;
- Verifying the historical GHG emissions and other environmental data and records for the fiscal year 2019; and
- Visiting Olympus Corporation Nagano Facility Tatsuno to assess whether the data management systems have been effectively implemented.
- By implementing the Company's "No Visitor" Policy due to the global infection spread of COVID-19, conducting the remote verification of Shirakawa Olympus Co., Ltd. and the headquarter of Olympus Corporation to assess whether the data management systems have been effectively implemented via e-mail, CISCO WebEx, and Microsoft Teams.

### Observations

The Company should further demonstrate the completeness, accuracy and reliability of its future environmental data reporting. This is particular to establish robust internal data control systems at consolidated subsidiary levels.

### LR's standards, competence and independence

LR implements and maintains a comprehensive management system that meets accreditation requirements for ISO 14065 *Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition* and ISO/IEC 17021-1 *Conformity assessment – Requirements for bodies providing audit and certification of management systems – Part 1: Requirements* that are at least as demanding as the requirements of the International Standard on Quality Control 1 and comply with the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants.

LR ensures the selection of appropriately qualified individuals based on their qualifications, training and experience. The outcome of all verification and certification assessments is then internally reviewed by senior management to ensure that the approach applied is rigorous and transparent.

This is the only work undertaken by LR for Company and as such does not compromise our independence or impartiality.

Signed

Dated: 14 July 2020

Norihiko Kinoshita

LR Lead Verifier

On behalf of Lloyd's Register Quality Assurance Limited

10th Floor, Queen's Tower A, 2-3-1 Minatomirai, Nishi-ku, Yokohama, JAPAN

LR reference: YKA4005278

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