

# Kawasaki

## Environmental Report 2019



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**Period**

The report covers fiscal 2018 (from April 1, 2018 to March 31, 2019). However, some activities from outside this period are also included. For overseas subsidiaries, the dates of the fiscal year and the period covered by statistics may differ depending on their location. Please note that in *Environmental Report 2019*, the Company has adopted the fiscal year notation that designates the stated fiscal year by the calendar year in which it begins. The year under review in this report is thus fiscal 2018, the year from April 1, 2018 to March 31, 2019. The notation used in previous publications may differ.

**Scope**

Kawasaki Heavy Industries, Ltd. However, where the Kawasaki Group (or "the Group") is described, the scope of reference includes subsidiaries (listed on page 24) that are subject to environmental management criteria.

**Issued:** August 2019

**Edited and issued by:** General Administration Division  
 Environmental Affairs Department

**Editorial responsibility:** Senior Manager, Environmental Affairs Department

**Guidelines**

In preparing the report, the editorial office referred to the Environmental Reporting Guidelines (2012 Edition) issued by the Ministry of the Environment of Japan.

**Disclaimer**

This report not only describes actual past and present conditions at the Kawasaki Group but also includes forward-looking statements based on plans, forecasts, business plans and management policy as of the publication date. These represent suppositions and judgments based on information available at the time. Due to changes in circumstances, the results and features of future business operations may differ from the content of such statements.

**Chief Environmental Officer's Message –To Realize a Sustainable Society–**

Spurred by the Paris Agreement reached at COP21, the transition to a carbon-free society is accelerating around the world. As this change progresses, to ensure that the Kawasaki Group's transport, energy, environment, and other industrial machinery-related businesses continue to grow going forward, we have designated the realization of a low-carbon society through business activities and product-based contributions as material issues in our CSR activities.

These material issues align with "Climate action," one of the United Nations' 17 Sustainable Development Goals, and are highly compatible with the Kawasaki Group's energy and environmental businesses. In addition, because transitioning to a low-carbon society solely by improving fossil-fuel based energy-saving technologies is unlikely, expectations regarding the development of innovative, carbon-free technologies are growing, and we believe that Kawasaki's technologies have the potential to contribute immensely.

The Kawasaki Group's Environmental Charter lays out values and principles for environmental management activities to be shared across the Group along with action guidelines to steer each individual in their daily work. Based on the Environmental Charter, in order to solve a wide range of social issues, including transitioning to a carbon-free society, and to realize a sustainable world, the Kawasaki Group engages in environmental management, including efforts to prevent global warming, take action against climate change, reduce environmental impact, and conserve biodiversity.

The Kawasaki Group has also formulated a long-term environmental vision as a roadmap for drafting specific measures to address the immediate as well as the medium- and long-term issues it faces. To succeed the Environmental Vision 2020, established in 2010, we established the Kawasaki Global Environmental Vision 2050 in 2017, laying out more ambitious goals (i.e., a vision for the Group's future). To ensure our steady progress toward the realization of the long-term environmental vision, our three-year medium-term environmental management plans lay out specific issues to address.

This *Kawasaki Environmental Report 2019* contains reporting on the results of activities in fiscal 2018,

the final year of the three-year Ninth Environmental Management Activities Plan, which was formulated based on the principles of Environmental Vision 2020. It also introduces the 10th Environmental Management Activities Plan, which maps out our initiatives going forward.

Looking at the results of activities carried out under the Ninth Environmental Management Activities Plan (FY2016–FY2018), although certain challenges remain (such as eliminating the use of hexavalent chromium, which had to be postponed due to the lack of a suitable alternative), overall, activities progressed as planned. Initiatives aimed at achieving Environmental Vision 2020 have steadily achieved results.

Under the 10th Environmental Management Activities Plan (FY2019–FY2021), we continue to focus on climate change countermeasures, particularly the transition to carbon-free energy. As we work toward Kawasaki Global Environmental Vision 2050, we will continue to pursue ambitious targets in order to overcome the challenges of decarbonizing energy, maintaining and improving product quality while eliminating the use of harmful chemical substances, and conserving natural resources with a focus on biodiversity.

Through environmentally harmonious business activities and environmentally conscious Kawasaki-brand products and services, the Kawasaki Group works with a wide range of stakeholders to conserve and improve the natural environment and to contribute to the creation of sustainable future. I hope that the information contained in this report will provide readers with a deeper understanding of the environment-oriented management practices of the Kawasaki Group.

**Ikuhiro Narimatsu**

Chief Environmental Officer  
 (Managing Executive Officer)



Environmental Charter (established 1999, revised 2010)

Environmental Philosophy

The Kawasaki Group pursues business activities globally in key industries related to land, sea, and air, guided by the desire to contribute to the development of society through *monozukuri* manufacturing. In this effort, as a group, we emphasize the “realization of a low-carbon society,” “realization of a recycling-oriented society,” and “realization of a society coexisting with nature” to help solve global environmental issues, and we strive to help build a sustainable society through environmentally harmonious business activities and environmentally conscious Kawasaki-brand products and services.

Conduct Guidelines

- Global environmental problems are serious issues shared by people around the world and, making it a management priority to ensure that business activities are conducted in harmony with the environment, we will strive willingly and vigorously toward this goal.
- We will endeavor to conserve resources, save energy, recycle, and reduce industrial waste in production stages, and we will promote efforts to limit the impact of our operations on the environment.
- We will carefully consider environmental impact during product planning, R&D and design stages to limit as much as possible any environmental impact caused during procurement, production, distribution, utilization and disposal stages of the products we make and market.
- We will strive to minimize the impact our business activities have on ecosystems and engage proactively in efforts to protect these ecosystems.
- In seeking solutions to global environmental issues, we will develop and provide new technologies and new products that effectively contribute to environmental protection and reduced consumption of energy and natural resources.
- Going beyond environment-related laws, regulations, conventions, and self-established action plans in related industries, we will implement our own environmental control standards, as appropriate, and strive to improve environmental management.
- Through environmental training and public relations activities, we will strive to elicit greater awareness of global environmental issues among all employees and will encourage employees to perform a self-improvement review and participate in social contribution activities.
- We will implement an environmental management system for environmental protection activities, hold regular conferences on environmental protection activities, undertake reviews, and strive to achieve continual improvement in our environmental protection activities.

Environmental Management Platform

Kawasaki appoints a chief environmental officer (director responsible for environmental management), who coordinates corporate environmental management activities and assumes full responsibility and authority for environment-oriented issues, and maintains a corporate environmental management system. (Fig. 1: Environmental Management System). Kawasaki establishes three-year environmental management activities plans alongside its medium-term business plans. Once a year, the Management Committee meets to evaluate progress toward the targets attributable to the previous year’s activities, consider where to seek improvement, and establish a plan for the current fiscal year (Fig. 2: Internal Management System). To implement this plan, specific approaches and methods are decided through the internal management system, including the Corporate

Environment Committee, which is chaired by the chief environmental officer, and the environment management committees of the internal companies.

Similarly, we have established an energy management system for energy-related measures (Fig. 3: Energy Management System). In accordance with Japan’s Energy Saving Law, the Chief Environmental Officer assumes the position of energy management officer, and the Corporate Energy Management Committee meets at least once a year and vigorously promotes energy-saving activities in line with the Company’s business scale.

Kawasaki has been working to build and maintain an effective environmental management system since 1994, and an energy management system since 2010. With sights set on achieving our future vision, we will consistently refine our approaches to realize improvements.

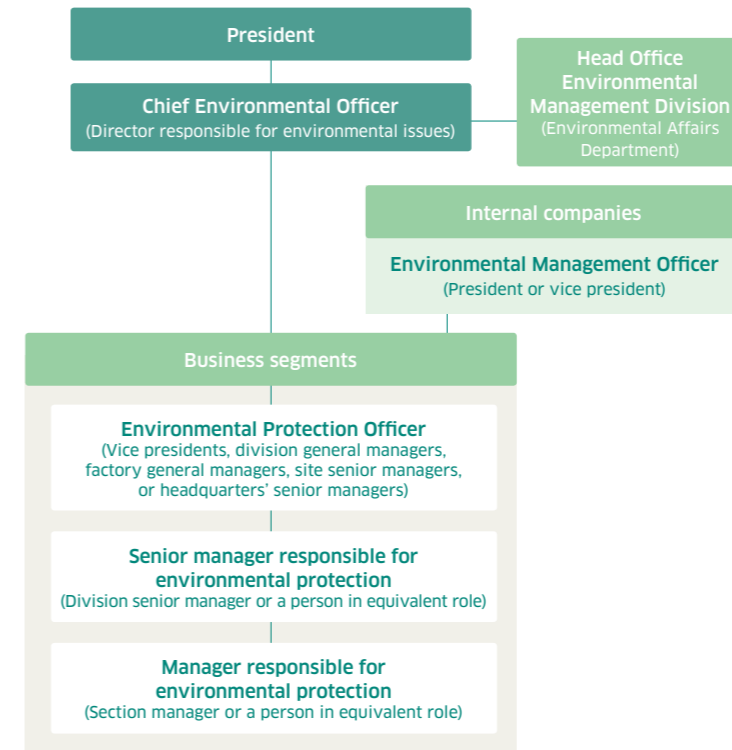


Figure 1: Environmental Management System

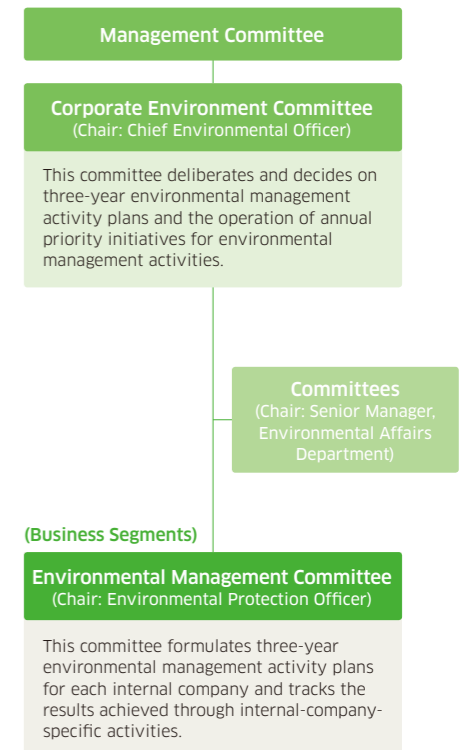


Figure 2: Internal Management System

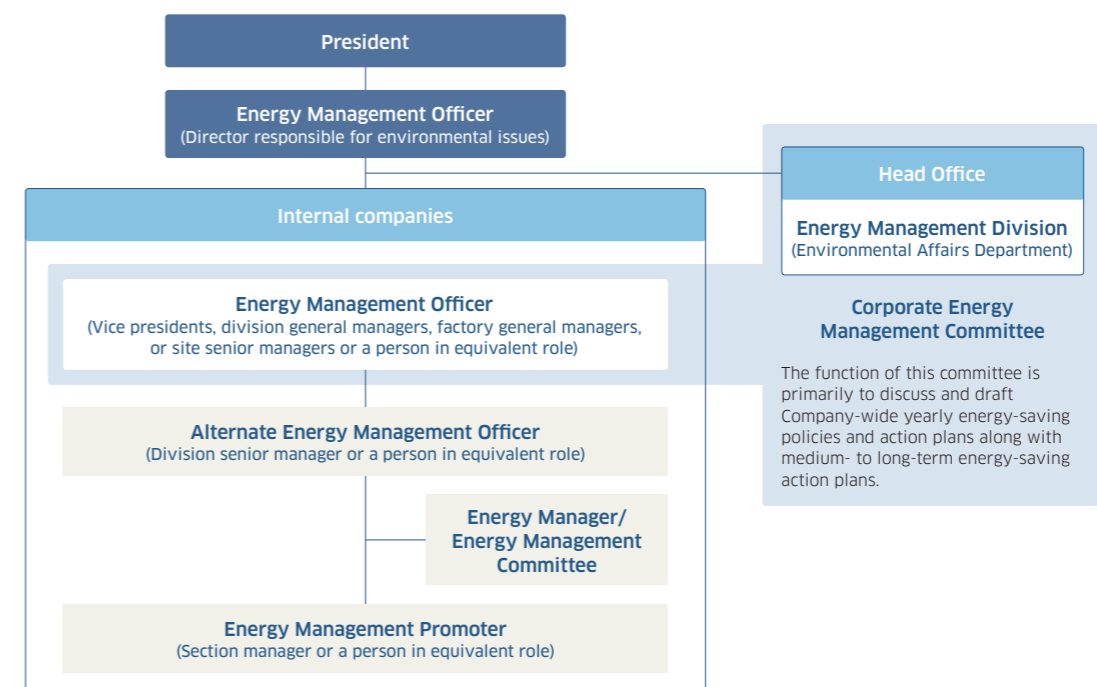


Figure 3: Energy Management System

# Global Environmental Vision 2050 and the Three-Year 10th Environmental Management Activities Plan

Kawasaki has established the 10th Environmental Management Activities Plan for the period from fiscal 2019 to fiscal 2021.

A more advanced version of the Ninth Environmental Management Activities Plan (FY2016–FY2018), which concluded in the previous fiscal year, the new plan is aimed at ambitiously taking on the Kawasaki Global Environmental Vision 2050's goals of being "CO<sub>2</sub> FREE," "Waste FREE," and "Harm FREE."

## Kawasaki Global Environmental Vision 2050

In 1994, Kawasaki formulated the First Environmental Management Activities Plan, and the entire Company began work on environmental conservation activities. Since then, we have promoted various environmental initiatives, including the establishment of the Environmental Charter in 1999 to demonstrate our commitment to the environment both inside and outside the Company and, looking to the long term, the formulation of the Environmental Vision 2010 in 2003 and the Environmental Vision 2020 in 2010.

In 2017, with three years left until 2020, we formulated the new Kawasaki Global Environmental Vision 2050 with the aim of taking on higher targets for 2050 while basically maintaining the focal points of Environmental Vision 2020. Having adopted the CO<sub>2</sub> emissions reduction targets set by the Japanese government for 2030 as our medium-term targets, we will tackle our major goals of achieving "CO<sub>2</sub> FREE," "Waste FREE," and "Harm FREE." We aim to achieve these goals through the implementation of our Environmental Management Activities Plan, which is reformulated every three years based on a comprehensive review of changes in social conditions and environmental technologies.

**2050 Kawasaki Challenge!**  
Waste FREE, CO<sub>2</sub> FREE, Harm FREE

**CO<sub>2</sub> FREE**

- Aim for zero CO<sub>2</sub> emissions in business activities
- Provide products and services that greatly curb CO<sub>2</sub> emissions

**Waste FREE**

- Aim for zero waste emissions in business activities
- Thoroughly enforce conservation and the recycling of water resources

**Harm FREE**

- Aim for zero harmful chemical substance emissions in business activities
- Develop business with respect for biodiversity

### Kawasaki Global Environmental Vision 2050 (Established in 2017)

- CO<sub>2</sub> FREE
- Waste FREE
- Harm FREE

### 2030 Targets

- Reduce CO<sub>2</sub> emissions by 26% (Compared to fiscal 2013 level)

### Environmental Vision 2020 (Established in 2010)

- Realization of a low-carbon society
- Realization of a recycling-oriented society
- Realization of a society coexisting with nature
- Establishment of environmental management systems

### Environmental Vision 2010 (Established in 2003)

- Environmental philosophy
- Environmental management
- Environmentally conscious products
- Environmentally conscious manufacturing
- Environmentally conscious communication

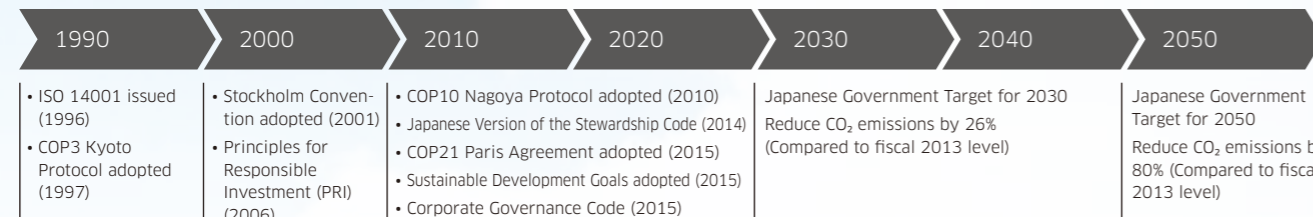
### Environmental Charter (Established in 1999/ Revised in 2010)

1994-

First to Ninth Environmental Management Activities Plans

2019-

10th Environmental Management Activities Plan



## Three-Year 10th Environmental Management Activities Plan

### Policy for Initiatives

Based on the environmental policy laid out in the Group Environmental Charter,<sup>1</sup> the Group Mission,<sup>2</sup> and assessments of the Ninth Environmental Management Activities Plan,<sup>3</sup> the Kawasaki Group has established key strategies to help meet society's needs (namely, those for ESG investment and information disclosure), realize both environmental conservation and business growth, and achieve the Kawasaki Global Environmental Vision 2050 goals of "CO<sub>2</sub> FREE," "Waste FREE," and "Harm FREE."

To realize a low-carbon society (CO<sub>2</sub> FREE), we will work to significantly cut CO<sub>2</sub> emissions by weighing the impact of related risks and opportunities<sup>4</sup> for our businesses to expand the provision of low-CO<sub>2</sub> products and further reduce CO<sub>2</sub> emissions from business processes. To realize a recycling-oriented society (Waste FREE) and a society coexisting with nature (Harm FREE), we will raise the level of management not just of the Company, but of the entire Group, work to further reduce environmental risk, and restore natural environments damaged by the construction of our plants.

At the same time, to help achieve the Sustainable Development Goals (SDGs), we will work mainly through the environmental and energy businesses to solve social issues from long-term perspective.

1. Please refer to p.2, "Environmental Charter."
  2. The Group Mission of "Kawasaki, working as one for the good of the planet."
  3. Please refer to p.7, "Summary of the Ninth Environmental Management Activities Plan."
  4. Risks:
    - Stricter CO<sub>2</sub> emission regulations, higher electricity costs, and increased pressure to transition to renewable energy
    - Power outages due to natural disasters
- Opportunities:
- Green energy generation using Kawasaki-brand products (onsite generation/intra-Group consignment) and hydrogen
  - Growing demand for power generation and dispersed power sources as means of business continuity planning

### 10th Environmental Management Activities Plan: Key Strategies

<b>(1) CO<sub>2</sub> FREE</b>	10th Plan Target: Reduce fiscal 2021 CO <sub>2</sub> emissions per unit of net sales by 20% from the fiscal 2013 level (non-consolidated).
	<p><b>Realization of a low-carbon society</b></p> <p><b>Proactive use of onsite power generation facilities</b> Consider energy supply and demand for each plant and draft concrete plans to adopt onsite power generation facilities. Consider both purchasing such facilities as internal capital expenditure and selling products for such facilities to energy supply companies and then using their power generation services.</p> <p><b>Utilize renewable energy</b> Purchase electricity from solar power generation facilities on the roofs of our plants</p> <p><b>Energy-saving activities</b> Promote energy saving by utilizing energy visualization systems and replacing aging equipment</p> <p><b>Expand the CO<sub>2</sub>-reducing effects of Kawasaki-brand Green Products and other products</b></p>
<b>(2) Waste FREE</b>	10th Plan Target: Maintain ratio of direct-to-landfill waste to total waste generation at less than 1% (non-consolidated)
	<p><b>Realization of a recycling-oriented society</b></p> <p><b>Further enforce waste sorting and recycling</b> Improve Group-wide management</p> <p><b>Precisely understand water uses and usage volumes</b> Confirm water resource risks</p>
<b>(3) Harm FREE</b>	10th Plan Target: Reduce environmental risk while operating factories with respect for biodiversity
	<p><b>Realization of a society coexisting with nature</b></p> <p><b>Properly manage harmful chemical substances and consider alternatives (Reduce Group-wide environmental risk)</b></p> <p><b>Identify the types of trees on factory grounds and, where appropriate, replace with native species while continuing Company-wide forest conservation activities</b></p>

# Summary of Environmental Activities in Fiscal 2018 and Results of the Ninth Environmental Management Activities Plan

Key Strategies	Ninth Environmental Management Activities Plan (FY2016-FY2018)	Fiscal 2018 Results	Page Number	Summary of the Three-Year Ninth Environmental Management Activities Plan
Realization of a low-carbon society CO <sub>2</sub> and energy cost reduction	<b>1. Reduce resource and energy costs, mainly through wider application of energy visualization systems</b> <b>Target</b> Reduce annual resource and energy costs by at least 5% <sup>1</sup> Reduction rate of 6.3% (target achieved)	Reduction rate of 6.3% (target achieved)  Slight decrease (target not achieved)  Communicated (or will communicate) via the following media (target on track to be achieved) • <i>Environmental Report</i> (this report) • <i>Kawasaki Report</i> (integrated report) (to be published in September 2019) • The Company website (to be updated in September 2019)	p. 9	<b>1. Reduce resource and energy costs, mainly through the wider application of energy visualization systems</b> By improving energy-saving efforts using energy visualization systems and installing energy-saving facilities, we achieved annual reduction rates of 5.9% to 7.1% (target achieved)
	<b>2. Reduce CO<sub>2</sub> emissions</b> <b>Target</b> Reduce CO <sub>2</sub> emissions per unit of net sales by at least 3% year on year <sup>2</sup> Slight decrease (target not achieved)			<b>2. Reduce CO<sub>2</sub> emissions</b> We met our goals for reducing CO <sub>2</sub> emissions per unit of net sales only in some years. Nevertheless, calculated using the CO <sub>2</sub> emission factors for specific power providers published each year by the Ministry of the Environment, emissions in the final year of the Ninth Environmental Management Activities Plan (fiscal 2018) came to 301,000 t-CO <sub>2</sub> , down 24,000 t-CO <sub>2</sub> from the 325,000 t-CO <sub>2</sub> emitted in the final year of the Eighth Environmental Management Activities Plan (fiscal 2015), indicating that, in effect, environmental impact had decreased.
	<b>3. Reduce CO<sub>2</sub> emissions through product-based contributions</b> <b>Target</b> Identify CO <sub>2</sub> emission reduction effects through product-based contributions and disclose to public			<b>3. Reduce CO<sub>2</sub> emissions through product-based contributions</b> We revised the rule for calculating the CO <sub>2</sub> reduction effect of products sold since fiscal 2017 to consider the useful life of products. This revision will enable us to better show the degree to which our products help reduce greenhouse gas emissions during product use.
Realization of a recycling-oriented society Promotion of the 3Rs	<b>1. Reduce total waste generation and maintain zero emissions</b> <b>Target</b> Reduce total waste generation per unit of net sales by at least 1% from level achieved under the Eighth Plan, and push the landfill disposal rate below 1% Reduction rate of 5.6% (target achieved) Landfill disposal rate of 0.2% (target achieved)	Reduction rate of 5.6% (target achieved) Landfill disposal rate of 0.2% (target achieved)  Recycling rate of 98% (target achieved)  164 kg of stabilizer and other waste treated (target achieved)	p. 14	<b>1. Reduce total waste generation and maintain zero emissions</b> We achieved a three-year average annual reduction in total waste of 6.9% and maintained zero emissions.
	<b>2. Promote reuse and recycling</b> <b>Target</b> Boost recycling rate above 98% Recycling rate of 98% (target achieved)			<b>2. Promote reuse and recycling</b> We continuously enforced strict waste sorting and promoted transition to recycling.
	<b>3. Promote PCB treatment</b> <b>Target</b> Systematically treat high- and low-concentration PCB waste			<b>3. Promote PCB treatment</b> We advanced disposal based on relevant laws, and completed 93% of processing of high- and low-concentration PCB waste on a disposal cost basis. From fiscal 2016 to fiscal 2018, we disposed of 222 transformers and condensers and 31 tons of stabilizer and contaminated material. Note: The above numbers are totals for high- and low-concentration waste. While the disposal of high-concentration PCB waste is almost complete, replacing transformers currently in use that contain low-concentrations of PCBs will be a task going forward.
Realization of a society coexisting with nature Reduction of environmental burden/promotion of resource conservation	<b>1. Reduce chemical substances</b> <b>Target</b> Reduce major VOCs <sup>3</sup> per unit of net sales by at least 1% from the level achieved under the Eighth Plan Major VOCs reduced by 25% (target achieved)  Cut dichloromethane by at least 1% year on year Dichloromethane reduced by 10% (target achieved)  Strive to reduce hexavalent chromium to zero, in principle, by fiscal 2020 Reduced to zero, excluding some special manufacturing processes (target not achieved)	Major VOCs reduced by 25% (target achieved)  Dichloromethane reduced by 10% (target achieved)  Reduced to zero, excluding some special manufacturing processes (target not achieved)	p. 16	<b>1. Reduce chemical substances</b> We achieved a three-year average annual reduction of 16%. To reduce major VOCs emitted in painting processes, we improved painting efficiency and advanced the adoption of alternative paints.  We achieved reductions as planned, except in fiscal 2016. In fiscal 2018, cleaning facilities that use a dichloromethane-free remover began operation, marking a major improvement. Ensuring quality and continuing to realize fundamental reductions by such means as adopting alternative processes will remain tasks going forward.  Hexavalent chromium and other heavy metals are indispensable in certain special manufacturing processes, and, in light of the specific characteristics of certain products, it has become clear that completely eliminating their use by 2020 will be difficult. Managing their use through the environmental management system to prevent accidents will be a task going forward.
	<b>2. Conserve water</b> <b>Target</b> Reduce annual consumption of water per unit of net sales by at least 1% Track cost effect of measures to conserve tap water and prevent leaks from water supply pipes Increase: 0.2% (target not achieved) Reduced costs by ¥9,000,000 per year through leak prevention and other measures			<b>2. Conserve water</b> We were unable to reduce consumption as planned over the three-year period. However, efforts to prevent leaks and other measures to reduce consumption saved ¥38 million over three years. In addition to efforts to save water and prevent leaks, initiatives to improve water usage efficiency based on actual usage conditions will be a task going forward.
	<b>3. Conduct forest conservation activities</b> <b>Target</b> Carry out forest conservation activities at least twice a year Carried out four times (target achieved)			<b>3. Conduct forest conservation activities</b> Forest conservation activities were undertaken a total of 12 times over three years, as planned. At a forest festival held in Hyogo Prefecture on November 4, 2018, Kawasaki received a forestation activities award from the Hyogo Governor in recognition of its forest conservation activities conducted in Taka, Hyogo Prefecture since 2008. This was the Company's first time receiving the corporate division award.
Establishment of environmental management systems Enhancement of the Kawasaki Group environmental management system	<b>1. Reinforce environmental management capabilities and lower environmental risk</b> <b>Target</b> Certified business sites to complete transition to ISO 14001:2015 One business site newly acquired certification, completing the transition at all sites (target achieved)  Visit domestic and overseas plants to better pinpoint status of environmental management Seven domestic plants were visited to obtain a better understanding of the status of their environmental management. Conducted discussions regarding the formulation of the 10th Environmental Management Activities Plan (target achieved)	One business site newly acquired certification, completing the transition at all sites (target achieved)  Seven domestic plants were visited to obtain a better understanding of the status of their environmental management. Conducted discussions regarding the formulation of the 10th Environmental Management Activities Plan (target achieved)	p. 22	<b>1. Reinforce environmental management capabilities and lower environmental risk</b> All business sites acquired certification by the September 14, 2018 transition deadline.  Through discussions with our domestic plants as well as domestic subsidiaries (EarthTechnica Co., Ltd., Kawasaki Thermal Engineering Co., Ltd., and Technica Corp.) and overseas subsidiaries (KMT), we worked to better understand the status of environmental management.
Heightened environmental reputation Heightened awareness as an environmentally friendly brand	<b>1. Leverage Kawasaki Green Product Promotion Activity</b> <b>Target</b> Register Kawasaki-brand Green Products every year and communicate data to public Registered nine new products in fiscal 2018 (target achieved) Communicated via the following media (target achieved) • The Company website (June 2018) • <i>Environmental Report</i> (November 2018)	Registered nine new products in fiscal 2018 (target achieved) Communicated via the following media (target achieved) • The Company website (June 2018) • <i>Environmental Report</i> (November 2018)	p. 26	<b>1. Leverage Kawasaki Green Product Promotion Activity</b> During the period of the ninth plan, we registered 32 new products, and we externally promoted the environmental labels we have created via our own publications as well as magazine advertisements and other media.
	<b>2. Enhance reputation through external evaluations and rankings</b> <b>Target</b> Announce results of third-party verification, improve evaluations from external organizations such as CDP, and sustain placement in Dow Jones Sustainability Indices (DJSI) Asia Pacific Index Received third-party verification on greenhouse gas emissions (target achieved)  Rating in the CDP evaluation was downgraded from "B" to "C" (target not achieved) Sustained placement in DJSI Asia Pacific Index (target achieved)			<b>2. Enhance reputation through external evaluations and rankings</b> We received third-party verification of our greenhouse gas emissions throughout the three years of the plan.  Kawasaki's CDP evaluation fell one grade in the final year of the plan. Analyzing the causes of this and related problems and taking steps to ensure that external rankings are commensurate with the actual results of initiatives will be tasks going forward. Kawasaki was selected for inclusion in DJSI Asia Pacific Index for a sixth consecutive year. In addition, Kawasaki was included in the SNAM Sustainable Investment Fund, operated by Sompō Japan Nipponkoa Asset Management (SNAM), for a third consecutive year.

Main Energy-Saving Improvements	Effect (Million yen/year)
Production systems	543
Ventilation	508
Compressed air	182
Lighting	155
Power receiving and distribution facilities	108



Transport of transformers taken out of service (PCBs are used in the insulation oil)



Hyogo Governor's forestation activities award



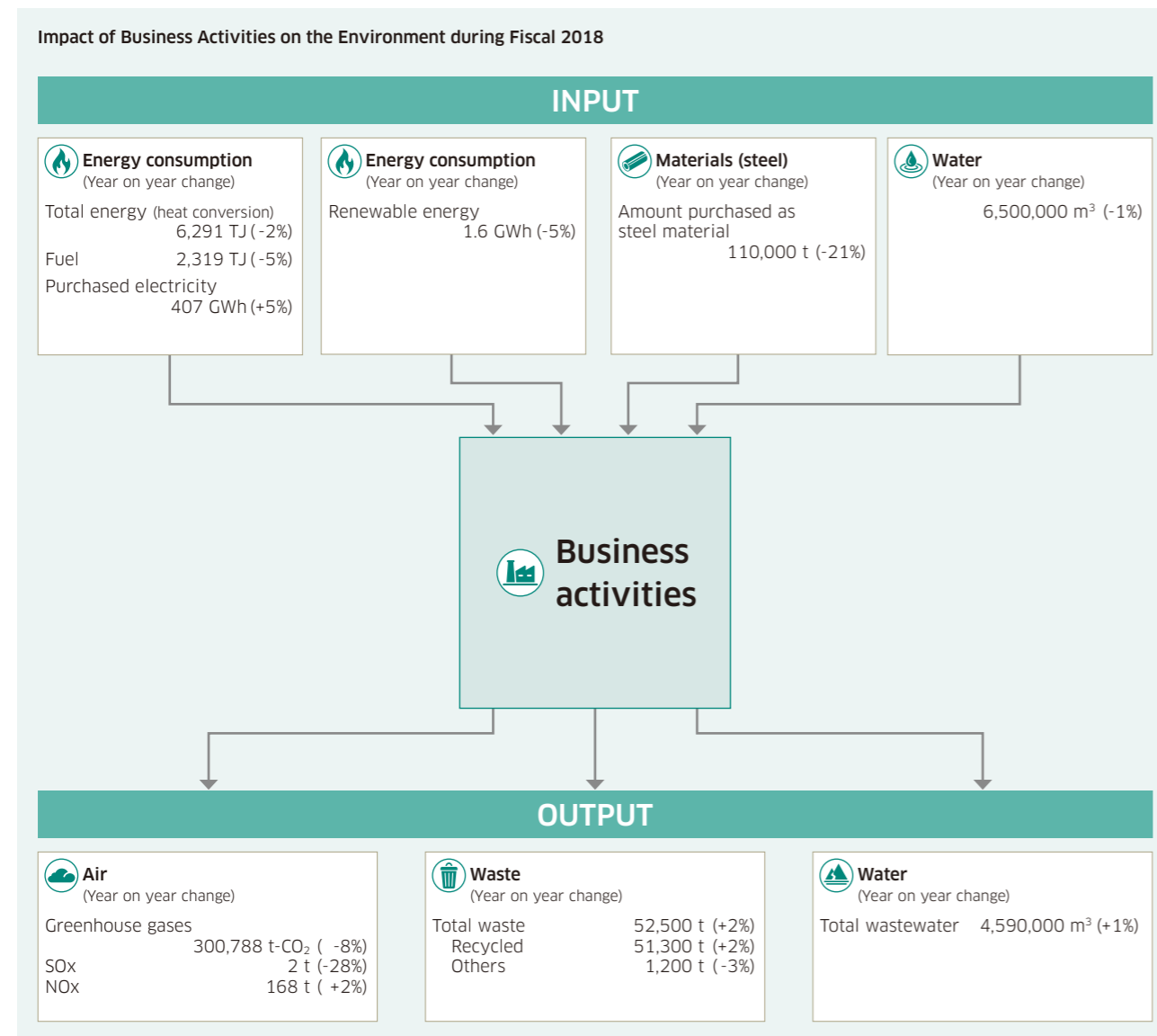
Internal training on the transition to ISO 14001:2015



1. Compared with BAU (business as usual, if no measures had been taken) projections  
 2. CO<sub>2</sub> emissions per unit of net sales are calculated by dividing CO<sub>2</sub> emissions volumes (with the CO<sub>2</sub> emission factors fixed at those for fiscal 2013) by net sales.  
 3. Major VOCs: For the Kawasaki Group, the major VOCs are toluene, xylene and ethylbenzene. VOCs: Volatile Organic Compounds

## Impact of Business Activities on the Environment during Fiscal 2018

The chart below shows the inputs—i.e., the materials, energy, and water—used in manufacturing Kawasaki’s products, as well as the environmentally burdensome outputs of the Company’s business activities for fiscal 2018.



## Realization of a Low-Carbon Society

Various global initiatives aimed at controlling global warming have started to come into force, including the Paris Agreement set at the United Nations Framework Convention on Climate Change.

Kawasaki is contributing to the prevention of global warming through products and manufacturing that efficiently use energy.

Under the Ninth Environmental Management Activities Plan, we improved manufacturing efficiency at plants in Japan by introducing energy visualization systems to quickly identify wasteful operations. In addition, by advancing the use of renewable energy, we achieved steady reductions in CO<sub>2</sub> emissions from business activities.

In light of governmental guidelines, we also adopted new rules for calculating the CO<sub>2</sub> reduction effect of product-based contributions. This has made our designation of applicable products and calculation periods more accurate, allowing us to more precisely use product-based contributions to appeal to global markets.

### Key Strategies and Targets under the Ninth Environmental Management Activities Plan (FY2016–FY2018)

#### CO<sub>2</sub> and energy cost reduction

Targets

- 1 **Reduce resource and energy costs, mainly through the wider application of energy visualization systems**
  - ▶ Reduce annual resource and energy costs by at least 5%
- 2 **Reduce CO<sub>2</sub> emissions**
  - ▶ Reduce CO<sub>2</sub> emissions per unit of net sales by at least 3% year on year
- 3 **Reduce CO<sub>2</sub> emissions through product-based contributions**
  - ▶ Identify CO<sub>2</sub> emission reduction effect through product-based contributions and disclose to public

## Energy-Saving Promotion Activities

The Company established an energy-saving promotion structure for each business segment and implemented various Company-wide energy-conservation initiatives.

### Energy-saving Grand Award

Kawasaki has operated the Company-wide Energy-saving Awards Program since 2017. The fiscal 2018 Energy-saving Grand Award went to “The creation of power source management mechanisms based on the visualization of electric devices used and idle times,” implemented by the Sakaide Works shipyard of the Ship & Offshore Structure Company. A great deal of electric equipment (such as temporary lighting, welders, and fans) is used in ships that are being fitted out (i.e., ships on which the internal equipment is being installed; Figure 4). This improvement was achieved by creating mechanisms to supply power only to the components necessary at any specific time.

Previously, even if employees wanted to turn off the power to devices when they were not using them, they ran into difficulties because some equipment must be left on 24 hours a day, and it is often hard to know who is using what power supply. To address this, the power sources of equipment that must be left on constantly and the supply lines for other equipment were separated, and employees were asked to file applications indicating who would be using what equipment when, revealing which devices did not require constant power supply. The Works then created a timer-based control board to automatically shut off power to unnecessary equipment, significantly reducing power consumption (Figure 5).

### Energy-saving Internal Audits

At each of Kawasaki's plants, the Company maintains facility management ledgers and management standards based on Japan's Energy Saving Law and works to rationalize energy use. The Akashi Works' Energy-saving Promotion Committee (which is also responsible for the Seishin Works and Kakogawa Works) has created and implemented Kawasaki's first energy-saving internal audits.

An audit team comprising the energy managers of the Akashi, Seishin, and Kakogawa works and staff from the committee's administrative office audited nine production sites in fiscal 2018, checking whether energy management was being carried out appropriately (Figure 6). These facilities will continue to execute annual energy-saving management audits to promote the further rationalization of energy use.

### Working Toward Further Energy Savings in Production

By incorporating production facility utilization data into Kawasaki's energy visualization system (K-SMILE), we enabled the simultaneous quantitative analysis of facility utilization and energy use (Figure 7). This has created a framework that allows us to understand facilities' rates of utilization as well as to identify equipment that consumes great deal of energy when not in use and take steps toward improvement. Going forward, we will strive to further improve the energy efficiency of production facilities.

## Reducing CO<sub>2</sub> Emissions from Production Activities

To reduce CO<sub>2</sub> emissions from production activities, Kawasaki is promoting Company-wide energy-saving activities aimed at cutting energy consumption.

In fiscal 2018, Kawasaki's energy-saving activities reduced annual energy consumption by approximately 360 TJ and annual CO<sub>2</sub> emissions by approximately 16 kt.

As a result, despite increases in energy consumption and CO<sub>2</sub> emissions due to increased facility operation and the beginning of operations at a new plant, Kawasaki's non-consolidated energy consumption for fiscal 2018 was down year on year, at 6,290 TJ (Figure 8).

Furthermore, thanks in part to a year-on-year decrease in CO<sub>2</sub> emission factors for specific power providers, CO<sub>2</sub> emissions fell to 301,000 tons (Figure 9).

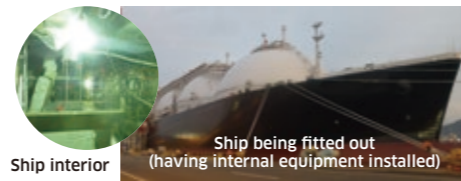


Figure 4: Energy-saving electric equipment is used for fitting out ships

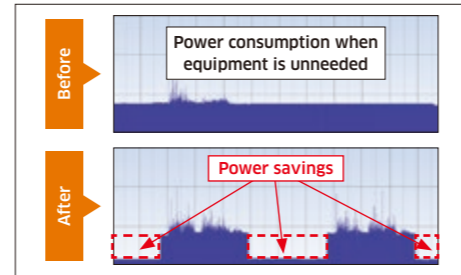


Figure 5: Power usage before and after power source management (analysis using the K-SMILE energy visualization system)



Figure 6: An energy-saving internal audit

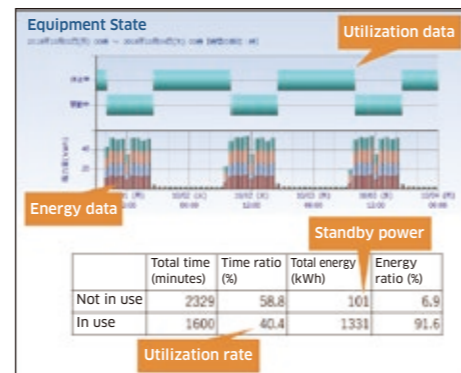


Figure 7: Simultaneous analysis of facility utilization and energy use using the K-SMILE energy visualization system

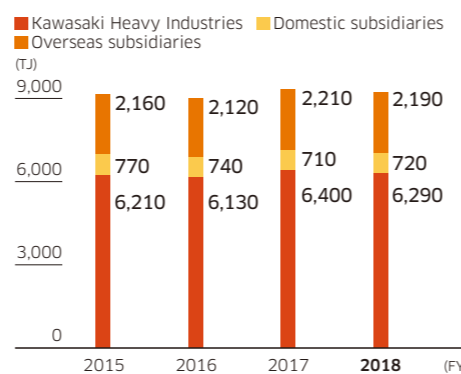


Figure 8: Energy Consumption in Production Activities

## Estimating Supply Chain CO<sub>2</sub> Emissions

The scope that Kawasaki is required to cover in tracking CO<sub>2</sub> emissions is expanding, characterized by an accelerating trend toward the inclusion of not only its own operations but also those of its supply chain. The standards for calculating emissions along our supply chain include the Corporate Value Chain (Scope 3) Accounting and Reporting Standard, established by the Greenhouse Gas Protocol, an internationally accepted set of greenhouse gas (GHG) calculation and reporting guidelines. In Japan, the Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain—a Japanese version of Scope 3—were prepared by the Research/Study Committee on Standards for Accounting and Reporting Organizations' GHG Emissions throughout the Supply Chain, established jointly by the Ministry of Economy, Trade and Industry and the Ministry of the Environment. Using these basic guidelines, Kawasaki calculated CO<sub>2</sub> emissions along its supply chain and received third-party verifications of the results (see Table 1, Table 2, and Verification Statement on page 40), and presents the results below. According to this data, the GHG effect accompanying the use of Kawasaki-sold products over the whole supply chain is extremely high. We have been making progress in reducing CO<sub>2</sub> emissions through product-based contributions, but, going forward, we will take an even more proactive approach.

Table 1: Fiscal 2018—the Kawasaki Group's Scope 1 and Scope 2 Calculation Results

Category	Calculation Targets	Calculation Results (kt-CO <sub>2</sub> /year)
<b>Scope 1</b>		
Direct emissions	Direct emissions through use of fuel at Kawasaki and associated industrial processes	162
<b>Scope 2</b>		
Indirect emissions from the generation of purchased energy	Indirect emissions accompanying use of electricity and heat purchased by Kawasaki	311

Table 2: Fiscal 2018—Kawasaki's Scope 3 Calculation Results

Category	Calculation Targets	Calculation Results (kt-CO <sub>2</sub> /year)
<b>Scope 3 (Other indirect emissions): Upstream</b>		
1. Purchased goods and services	Emissions associated with activities up to production of raw materials, parts, purchased goods and sales-related materials	6,049 (4.5%)
2. Capital goods	Emissions from construction and production of Kawasaki's capital goods	293 (0.2%)
3. Fuel- and energy-related activities not included under Scope 1 or Scope 2	Emissions associated with procurement of fuel from other providers and procurement of fuel required to generate power, such as electricity and heat	37 (0.0%)
4. Upstream transportation and distribution	Emissions associated with logistics of raw materials, parts, purchased goods, and sales-related materials up to delivery to Kawasaki	8 (0.0%)
5. Waste generated in operations	Emissions associated with transportation and processing of waste generated by Kawasaki	12 (0.0%)
6. Business travel	Emissions associated with business travel by employees	15 (0.0%)
7. Employee commuting	Emissions associated with transportation of employees between their homes and their worksites	7 (0.0%)
8. Upstream leased assets	Emissions associated with operation of assets leased by Kawasaki (excluding those included in Scope 1 or Scope 2 calculations)	Included in Scope 1 and Scope 2 calculations
<b>Scope 3 (Other indirect emissions): Downstream</b>		
9. Downstream transportation and distribution	Emissions associated with transportation, storage, cargo handling, and retail sales of products	0 (0.0%)
10. Processing of sold products	Emissions associated with processing of intermediate products by companies	Excluded <sup>1</sup>
11. Use of sold products	Emissions associated with use of products by consumers and companies	126,823 (95.1%)
12. End-of-life treatment of sold products	Emissions associated with transportation and treatment of products upon disposal by consumers and companies	Excluded <sup>1</sup>
13. Downstream leased assets	Emissions associated with operation of assets leased to other companies	Excluded <sup>2</sup>
14. Franchises	Emissions by franchisees	Excluded <sup>2</sup>
15. Investments	Emissions related to operation of investments	173 (0.1%)

1. Excluded from calculation target because Kawasaki is unable to confirm reference data at this time.  
2. Excluded from calculation target because it is outside of the scope of our business.

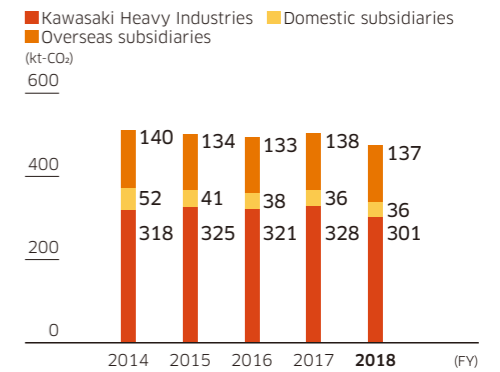


Figure 9: CO<sub>2</sub> Emissions from Production Activities

Notes: 1. The CO<sub>2</sub> emission factors are the figures published by Japan's Ministry of the Environment for each power provider in each fiscal year.  
2. For overseas sites, the CO<sub>2</sub> emission factors are the figures published by the Greenhouse Gas Protocol.

## Reduction of CO<sub>2</sub> Emissions in Logistics Processes

Kawasaki takes steps to pinpoint CO<sub>2</sub> emissions and promote energy-saving activities in its logistics processes, which cover some of its supply chain (Scope 3, Category 4 "Upstream transportation and distribution"), to realize continuous reduction in CO<sub>2</sub> emissions.

In fiscal 2018, CO<sub>2</sub> emissions increased by 5% year on year, to approximately 4,200 tons (with energy consumption at approximately 60,000 GJ), due to an increase in cargo transport by truck as a result of increased sales volumes of mass-produced products.

Amounts for the past five years are shown in Figure 10 and Figure 11.

## Utilizing Renewable Energy

The Kawasaki Group is making its production and other equipment more energy efficient and advancing the use of renewable energy to reduce the CO<sub>2</sub> emissions from its plants. We are installing solar power generating systems at our plants, and currently have a total solar power generation capacity of 4,171 kW, including subsidiaries (some installations were subsidized by the New Energy Promotion Council).

In fiscal 2018, we generated approximately 4.7 GWh of power (Figure 12), of which, approximately 1.6 GWh came from renewable energy sources and was used in-house, reducing CO<sub>2</sub> emissions by approximately 700 tons.

**Table 3: The Kawasaki Group's Solar Power Generation Capacity**

Name	Power Usage	Generation Capacity (kW)
Iwaoka Photovoltaic Power Generation Station <sup>1</sup>	Sold via FIT <sup>2</sup>	1,505
Nagoya Works 1	Used in-house	750
Seishin Photovoltaic Power Generation Station <sup>1</sup>	Sold via FIT	701
Nishi-Kobe Works	Used in-house	505
Nishi-Kobe Photovoltaic Power Generation Station <sup>1</sup>	Sold via FIT	422
Akashi Works	Used in-house	140
Sakaide Works	Used in-house	50
Kakogawa Photovoltaic Power Generation Station <sup>1</sup>	Sold via FIT	48
Hyogo Works	Used in-house	25
Kobe Works	Used in-house	20
Harima Works	Used in-house	5
Total		4,171

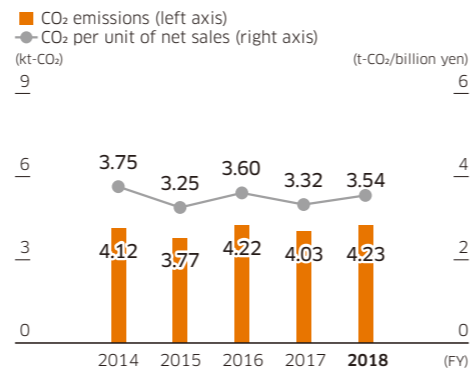
1. Power generation facility operated by Kawasaki Trading Co., Ltd.  
2. FIT: Feed-in tariff; a program in which renewable energy is bought back at a fixed rate



**Figure 13: Nagoya Works 1: 750-kW power generation facility**

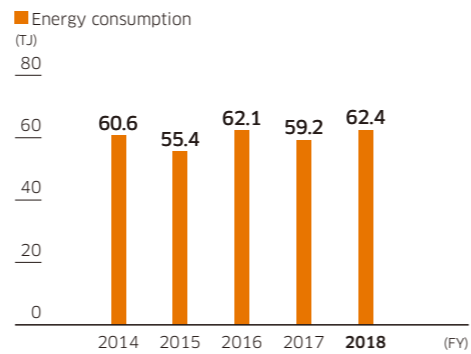


**Figure 14: Nishi-Kobe Works: 927-kW power generation facility (of which 422 kW are sold via FIT)**

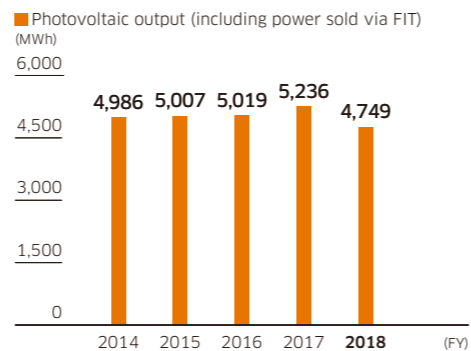


**Figure 10: CO<sub>2</sub> Emissions from Logistics Processes and CO<sub>2</sub> Emissions Per Unit of Net Sales**

Notes: 1. Per unit of net sales figures are obtained by dividing CO<sub>2</sub> emissions by net sales.  
2. The CO<sub>2</sub> emissions factors used are values published by the Agency for Natural Resources and Energy.



**Figure 11: Energy Consumption from Logistics Processes**



**Figure 12: Photovoltaic Output (Including Power Sold via FIT)**

## Reducing CO<sub>2</sub> Emissions through Product-Based Contributions

About 90% of CO<sub>2</sub> emitted during the life cycles of our products is released during the period of their use after they are sold. Therefore, the Company seeks to realize a low-carbon society by providing products that produce only low CO<sub>2</sub> emissions during their use. In fiscal 2017, we established new rules for calculating the CO<sub>2</sub> emissions reduction through product-based contributions in order to better quantify the contributions of highly energy efficient products to the mitigation of global warming.

Calculations based on these rules showed that the CO<sub>2</sub> emissions reduction through products we sold in fiscal 2018 was about 29.1 million tons. Large contributions were made mainly by the Green Gas Engine, a Kawasaki-brand Green Product boasting world-leading power-generation efficiency, and the M7V Series motors for HSTs,<sup>1</sup> which boasts world-leading output control.

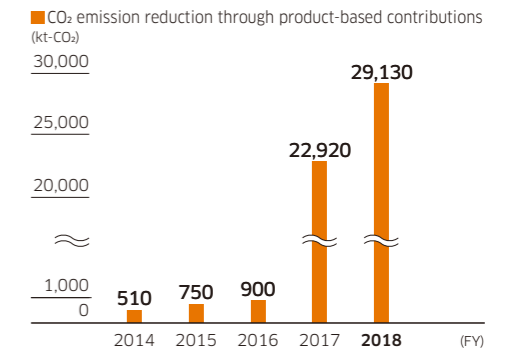
In order to quantify the contributions of highly energy efficient products to the mitigation of global warming, products included in the calculation of CO<sub>2</sub> emissions reduction through product-based contributions include power generated through waste heat, waste, renewable energy, and so forth. As a result, some of the products included differ from those included in the calculation of Scope 3, Category 11, which covers only energy-derived CO<sub>2</sub> emissions.

Amounts for the past five years are shown in Figure 15.

## Calculation Rules

- Products to be assessed: Kawasaki-brand Green Products, products that use waste, waste heat, and renewable energy, as well as cogeneration systems and rolling stock pertaining to modal shifts, etc., were selected for assessment.
- Period of assessment: We previously used a one-year period of assessment. However, we have now adopted a flow-based approach<sup>2</sup> in which the period of assessment is the estimated useful life of products sold in the fiscal year, because the estimated useful lives of our products are long. This allows us to better calculate the difference in CO<sub>2</sub> emissions between our products and industry standard class products over the entire period of use.

1. HST: Hydrostatic transmission: A non-stage transmission comprising a hydraulic pump and hydraulic motors.  
2. Please refer to the "Guideline for Quantifying Greenhouse Gas Emission Reduction Contribution" (Ministry of Economy, Trade and Industry, March 2018).



**Figure 15: CO<sub>2</sub> Emission Reduction through Product-Based Contributions**

Notes: 1. Kawasaki uses CO<sub>2</sub> emissions factors provided in the list of calculation methods and emissions factors published by Japan's Ministry of the Environment.  
2. The CO<sub>2</sub> emission reduction effect through product-based contributions achieved through the higher energy efficiency of products is based on a comparison using industry standard products.  
3. The application of waste heat, waste, and renewable energy is counted toward the CO<sub>2</sub> emissions reduction effect through product-based contributions.



# Realization of a Recycling-Oriented Society

Efforts to curb the consumption of natural resources and reduce waste have acquired greater social urgency, reflecting wider economic activity and population growth.

By promoting resource efficiency in its products and manufacturing processes, Kawasaki takes great care to effectively utilize and recycle the planet's finite resources.

Through ongoing initiatives in our business activities and efforts to promote their penetration in workplaces, we have maintained landfill disposal and recycling rates at our target levels.

In addition, we practice appropriate storage management of PCB waste, a type of industrial waste subject to special control that has been banned from use. We are advancing the treatment of this waste according to a plan for completion by the legally mandated deadline.

## Key Strategies and Targets under the Ninth Environmental Management Activities Plan (FY2016-FY2018)

### Promotion of the 3Rs

Targets

- 1 **Reduce total waste generation and maintain zero emissions**
  - ▶ Reduce total waste generation per unit of net sales by at least 1% from level achieved under the Eighth Plan and push the landfill disposal rate below 1%
- 2 **Promote reuse and recycling**
  - ▶ Boost recycling rate above 98%
- 3 **Promote PCB treatment**
  - ▶ Systematically treat high- and low-concentration PCB waste

## Reduction of Total Waste Generation

We are continuing activities to achieve our targets to reduce waste generated through our manufacturing processes per unit of net sales by using resources effectively, and to achieve zero waste disposed of in landfills through the promotion of recycling.

In fiscal 2018, waste generated per unit of net sales amounted to 43.9 tons/billion yen, a reduction of 5.6% compared to the average from fiscal 2013 to fiscal 2015 (Figure 16). The landfill disposal rate was 0.2%, achieving the target of 1% or less. Moreover, our recycling rate was 98%. Going forward, we will continue to pursue initiatives with a focus on the 3Rs. Amounts for the past five years are shown in Figure 16.

## Promoting PCB Treatment

The disposal of PCB (polychlorinated biphenyl) waste is proceeding worldwide, in line with the Stockholm Convention, which includes stipulations on the proper treatment of PCBs. In Japan, disposal is undertaken in a systematic manner, mainly by the Japan Environmental Storage & Safety Corporation (JESCO), which was established by the Ministry of the Environment. We are undertaking the treatment of our PCBs, aiming for completion ahead of the national schedule.

To achieve our disposal targets, we are steadily ceasing use of equipment that contains PCBs (low-concentration PCB waste), putting such items into storage, and considering treatment service providers. In fiscal 2018, all of the high-concentration PCB waste stored by the Company was awaiting treatment by JESCO. Kawasaki will continue to store this waste safely until a treatment schedule is finalized.

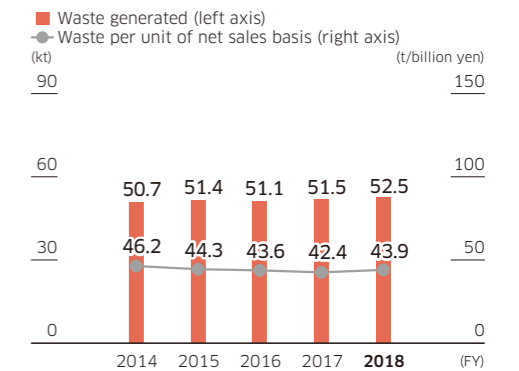


Figure 16: Waste Generated and Waste per Unit of Net Sales

Note: Per unit of net sales figures are obtained by dividing waste generated by net sales.

# Realization of a Society Coexisting with Nature

Modern society is maintained by the value provided by natural ecosystems, including material cycles and the regeneration of air, water, and soil environments.

Kawasaki strives to reduce its environmental impact through products and manufacturing processes that exist in harmony with the global environment and contributes to the protection of ecosystems.

To reduce risks imposed on the natural environment, we are reducing the use of harmful chemical substances in our production activities.

In addition, we directly take part in environmental conservation activities in local communities in an effort to improve the environment and protect ecosystems.

## Key Strategies and Targets under the Ninth Environmental Management Activities Plan (FY2016–FY2018)

### Reduction of environmental burden/ promotion of resource conservation

Targets

#### 1 Reduce chemical substances

- ▶ Reduce major VOCs per unit of net sales by at least 1% from the level achieved under the Eighth Plan
- ▶ Cut dichloromethane by at least 1% year on year
- ▶ Strive to reduce hexavalent chromium to zero, in principle, by fiscal 2020

#### 2 Conserve water

- ▶ Reduce annual consumption of water per unit of sales by at least 1%
- ▶ Track cost effect of measures to conserve tap water and prevent leaks from water supply pipes

#### 3 Continue with forest conservation activities

- ▶ Carry out forest conservation activities at least twice a year

## Chemical Substance Reduction

As chemical substances used in processes to manufacture products can have a detrimental effect on human health and ecosystems, we conduct proper management and strive to reduce the use of such substances. We have set targets for major VOCs (toluene, xylene, and ethylbenzene), dichloromethane, and hazardous heavy metals (lead compounds and hexavalent chromium compounds) in each business segment, and are reducing our use and emissions of said substances (Figure 17).

To reach these targets, in fiscal 2018, we made progress in improving efficiency in painting and introducing alternatives to current paints to reduce major VOCs emitted in the painting process. As a result, we achieved our annual reduction targets for major VOCs. We also achieved our reduction targets for dichloromethane and hazardous heavy metals.

Going forward, we will continue to conduct proper management of chemical substances while aiming to reduce their use and emission.

Furthermore, we are appropriately identifying chemical substances at each business site and notifying the government based on the Pollutant Release and Transfer Register Law (PRTR Law) (Figure 18).

## Responding to the ELV Directive,<sup>1</sup> the RoHS Directive,<sup>2</sup> and the REACH Regulation<sup>3</sup>

Since 2000, laws and regulations related to chemical substances have been strengthened in the European Union (EU) by the establishment of such controls as the ELV Directive, the RoHS Directive, and the REACH Regulation.

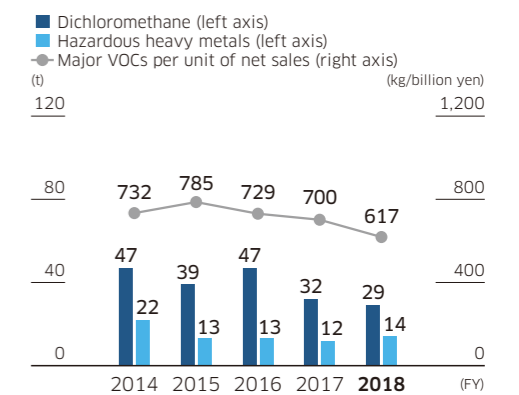
The ELV Directive focuses on automobiles, and while motorcycles are not subject to the content of this directive, the Motorcycle & Engine Company has embraced the voluntary initiatives espoused by the Japan Automobile Manufacturers Association (JAMA), which are on par with the ELV Directive requirements. The Precision Machinery & Robot Company also applies this directive to some of our products. The RoHS Directive covers electric and electronic products. The Precision Machinery & Robot Company, which includes the Robot Division, complies with the directive for some of its products. In addition, the Motorcycle & Engine Company's general-purpose engine business completed system improvements during fiscal 2018 in preparation for the revised version of the RoHS Directive (RoHS 2) that went into effect in July 2019. The REACH Regulation went into effect in June 2007 and applies to all chemical substances manufactured in and imported by the EU. Enterprises that manufacture or import one ton or more of chemical substances a year are required to register said chemical substances.

As Kawasaki products are mainly molded articles, only a limited number need to be registered under these regulations. Registration and notification are, however, compulsory for all substances that are deliberately emitted and all substances that are carcinogenic or otherwise of high concern. In addition to registration and notification, regulations exist for the evaluation, authorization, restriction, and communication of information regarding chemical substances, necessitating a system to gather and manage information about the chemical substances in products throughout our entire supply chain.

Laws and regulations related to chemical substances are being strengthened not only in the EU, but in many countries around the world. As requirements vary by country, for instance, regarding the substances and products covered, we believe that our response must be based on a firm understanding of the law.

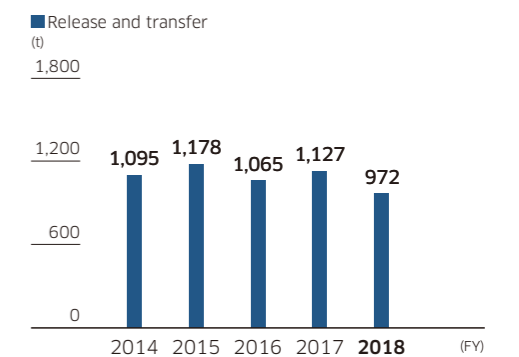
Kawasaki has established CSR Procurement Guidelines and responds to requests from customers to gather chemical substance information. In addition, the Motorcycle & Engine Company has created the Kawasaki Material Data System II<sup>4</sup> to collect data about chemical substances in order to respond to REACH and other applicable chemical substance regulations.

 **CSR Procurement Guidelines**  
[https://global.kawasaki.com/en/corp/sustainability/procurement/pdf/csr\\_tyoutatsu\\_guideline.pdf](https://global.kawasaki.com/en/corp/sustainability/procurement/pdf/csr_tyoutatsu_guideline.pdf)



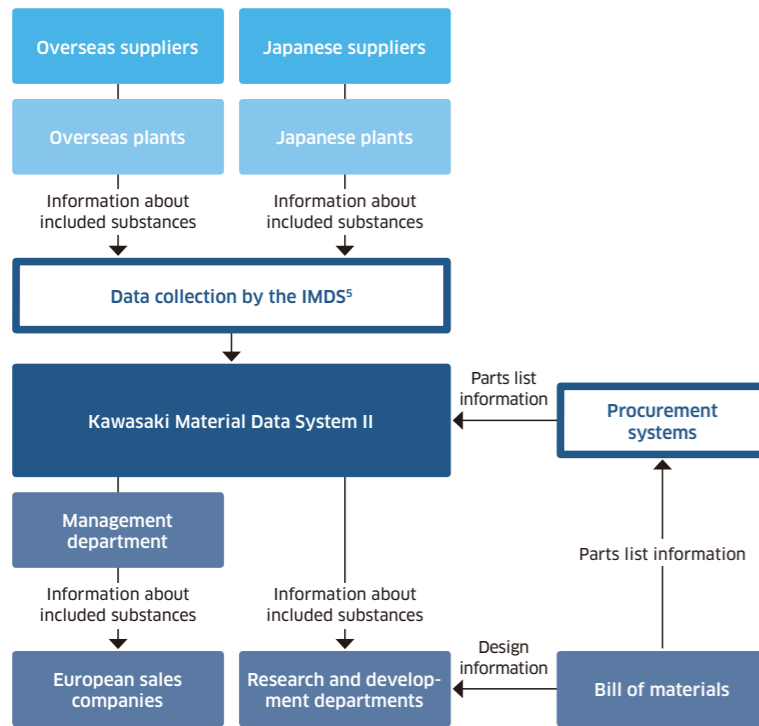
**Figure 17: Emissions and Handling Volume of Managed Chemical Substances**

Notes: 1. Major VOCs per unit of net sales figures are obtained by dividing VOC emissions by net sales.  
2. Figures for hazardous heavy metals represent the combined amounts of lead compounds and hexavalent chromium compounds. Reduction activities are undertaken separately for each substance.



**Figure 18: Release and Transfer of Chemical Substances Designated under the PRTR Law\***

\* PRTR Law: Pollutant Release and Transfer Register Law (Order for Enforcement of the Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof)



**Figure 19: Response to Chemical Substance Regulations by the Motorcycle & Engine Company**

1. ELV Directive: End of Life Vehicles Directive
2. RoHS Directive: Directive on Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment
3. REACH Regulation: Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals
4. Kawasaki Material Data System II
5. IMDS: International Material Data System, the automotive industry's standard materials data collection system, used by finished automakers around the world.

## Initiatives at the Motorcycle & Engine Company

### Reducing Exhaust Emissions

Fiscal 2018 marked the worldwide launch of the Versys 1000 SE, a large adventure model motorcycle that achieves outstanding low exhaust gas levels. Although this is a 2019 model, its exhaust gas emission levels, including those of CO and NOx, meet the Euro 5 emission standards that will go into effect in 2020. It is being sold in Europe, Japan and elsewhere, thanks to its compliance with R41-04 noise emission regulations.



**Figure 20: VERSYS 1000 SE**

### Promoting the 3Rs

Since October 2004, we have operated an independent motorcycle recycling system in cooperation with other motorcycle manufacturers and importers in Japan. In fiscal 2018, we achieved a recycling rate of 97.5%. Since October 2011, there has been no cost to users to recycle their motorcycles (excluding transportation costs).

For new-model motorcycles, we emphasize environmentally conscious designs highlighting reduced materials and more recycling, right from the development phase. We conduct preliminary evaluations of efforts related to the 3Rs—reduce, reuse, and recycle—before commencing design, prototyping, and mass production phases. In particular, we seek to increase recyclability through greater use of materials that are easy to recycle, and we have achieved a potential recycling rate exceeding 90% on every model, with most models exceeding 95%. This potential recycling rate was calculated based on the Guidelines for Definition and Calculation Method on the Recyclability Rate for New Vehicles (1998 Japan Automobile Manufacturers Association).

### Reducing and Eliminating Environmental Substances of Concern

For new-model motorcycles sold in Japan, we already meet voluntary reduction targets for environmental substances of concern (lead, mercury, hexavalent chromium, and cadmium) set by the Japan Automobile Manufacturers Association, and we have also achieved voluntary targets for older models still being sold.

For general-purpose engines and JET SKI watercraft, there are no Japanese regulations on heavy metals, like the JAMA voluntary reduction targets, but we are making elimination and reduction efforts that mimic those applied to motorcycles, and we achieved voluntary reduction targets for lead, mercury, and cadmium by fiscal 2007. Very small amounts of hexavalent chromium remaining in some components were then eliminated in fiscal 2008.

## Conserving Water

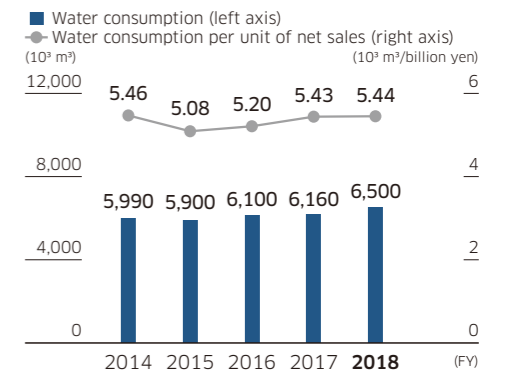
Kawasaki has set reduction targets for water consumption per unit of net sales in an effort to more effectively use water. In fiscal 2018, water consumption per unit of net sales increased 0.2% year on year (Figure 21).

## Forest Conservation Activities

We are engaged in forest conservation activities in two locations: Hyogo Prefecture and Kochi Prefecture.

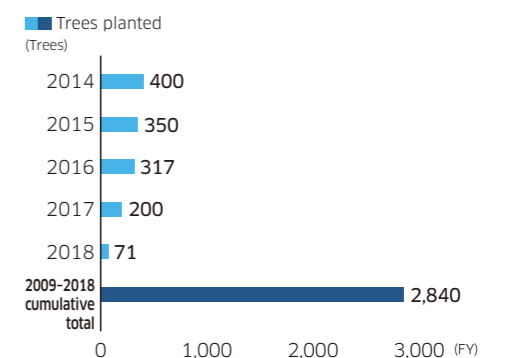
In Hyogo Prefecture, we have participated in the prefecture's corporate forest restoration project since December 2008. Our forest conservation activities started out at a community forest that we named Kawasaki Heavy Industries Saidani Nagomi-no-Mori, in the town of Taka. In 2014, we changed the location of our activities within this town, and we are continuing our efforts under the new name Kawasaki Heavy Industries Yokamura Park Nagomi-no-Mori.

Since the start of our forest conservation activities in 2008, the number of participating employees and their family members has reached a cumulative total of approximately 2,220 people, and approximately 2,840 trees consisting of 47 varieties, including Japanese red pine, konara oak, and mountain cherry, have been planted (Figure 22). In fiscal 2018, activities included clearing undergrowth and trimming and thinning trees, with the focus mainly on the maintenance of trees planted in previous years.



**Figure 21: Water Consumption and Water Consumption Per Unit of Net Sales**

Note: Per unit of net sales figures are obtained by dividing water consumption by net sales.



**Figure 22: Trees Planted**

In addition, in Kochi Prefecture, we have participated in a prefecture-organized forest restoration project aimed at forest regeneration since 2007, implementing activities in the town of Niyodogawa. Every year, new employees of the Company conduct forest conservation activities such as forest thinning, deepening our level of exchange with the local community.

**Table 4: Fiscal 2018 Achievements**

Activity location	Taka, Hyogo Prefecture	Niyodogawa, Kochi Prefecture
Activity content	Tree pruning and thinning, undergrowth clearing, tree planting, nature observation events, papermaking	Tree thinning, environmental education
Participants	Employees and their families, and others (237 people)	Employees and others (66 people)
Achievements	Area: 0.7 ha CO <sub>2</sub> absorbed: 1.26 t Trees planted: 71	Area: 0.3 ha CO <sub>2</sub> absorbed: 13.8 t
Number of events	3	1

### Environmental Education through Forest Conservation Activities

We carry out forest conservation activities, such as forest development and experiential learning, every year to provide opportunities for thinking about the environment.

**Table 5: Fiscal 2018 Achievements**

Activity content	Aim	Date
Nature observation events (Figure 23)	Interact with nature and learn about the importance of forests (Through nature observation in forests severely affected by pine wilt, participants gain a firsthand understanding of the necessity of forest maintenance by seeing the state of fallen trees and soil erosion, even as they experience the bounty of nature in the plants, birds, and other wildlife living amid such challenging conditions)	April 2018
Postcard-making workshop using milk cartons (Figure 24)	Learning about paper recycling (Participants try dyeing using onions and grape skins commonly thrown away as trash)	November 2018



Nature observation on a hiking course through an area where many pine trees have succumbed to pine wilt



A species of violet that participants found during the event

Participants listening for the echo of their voices off the mountain-side at the end of the event

**Figure 23: Nature watching event (with the cooperation of the Hyogo Mori no Club, an NPO)**



Participants made paper from milk cartons to make post cards

**Figure 24: Paper-making class (with the cooperation of Kawasaki Heartful Service Co., Ltd.\*)**

\* Kawasaki Heartful Service Co., Ltd. is a special subsidiary of Kawasaki Heavy Industries, Ltd., established to support the workplace retention of people with disabilities. Its main business is contracted general administration and cleaning services. It also engages in the business of recycling milk cartons to make paper.

### Biotope Initiatives Using Plant Wastewater

Working in cooperation with Akashi City and Ecowing Akashi, a citizens' group, Akashi Works created the Kawasaki Group's first biotope using plant wastewater. The biotope was designed around the three concepts of creating a local forest using local materials, achieving biodiversity, and reusing plant wastewater.

#### ① Creating a local forest using local materials

By preferentially using plants from Akashi City and the eastern Harima area as well as using aquatic plants and soil from Kanegasaki Park, in Akashi City, in the biotope's pond, we secured plants that naturally grow in the region and harmonized the biotope with the surrounding area.



Biotope just after completion in February 2019

The biotope as of April 2019



The biotope in April 2019. A variety of seasonal flowers can be seen blooming.

#### ② Achieving biodiversity

Japanese rice fish and cherry shrimp—both rare species—that found their way into irrigation canals on plant grounds were captured and released into the biotope. We tried to make it easy for aquatic life and insects to move into the area around the pond by, for example, stacking logs there.



Japanese rice fish

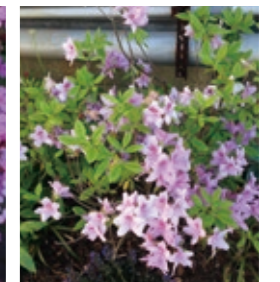


Cherry shrimp

Plants in the biotope



Moss phlox



Rhododendron

#### ③ Reusing plant wastewater

The water that flows through the biotope is wastewater that has been treated inside the plant. This is wastewater that contained harmful chemical substances before being purified to a state that is safe for plants and animals to live in.



Wastewater treatment facilities



Cabbage butterfly



Japanese wagtail

## Establishment of Environmental Management Systems

Kawasaki has established an environmental management system (EMS) and is conducting various other initiatives aimed at the realization of a low-carbon society, realization of a recycling-oriented society, and realization of a society coexisting with nature.

We are working to build and improve our environmental management platform to achieve Environmental Vision 2020.

We will realize the achievements of environmental management sought in the long-term vision through the operation of the EMS. The appropriate operation of the EMS will enable ongoing reductions in our environmental impact, helping improve on the status quo and enhance environmental performance.

The EMS has been put in place at all of our production facilities, and we are now working toward the next long-term vision.

### Key Strategies and Targets under the Ninth Environmental Management Activities Plan (FY2016–FY2018)

#### Enhancement of environmental management systems

Targets

- 1 Reinforce environmental management capabilities and lower environmental risk
  - ▶ Certified business sites to complete transition to ISO 14001:2015
  - ▶ Visit domestic and overseas production sites to better pinpoint status of environmental management

## Kawasaki Group EMS

To promote environmental management throughout the Group, Kawasaki and its subsidiaries are building an environmental management system.

Kawasaki's production sites and domestic and overseas subsidiaries have completed the acquisition of ISO 14001 certification or simplified EMS certification, or they have established EMS through self-declaration within the scope stipulated by Kawasaki.

The latest information on the establishment of EMS within the Group is shown in Figure 25, while the ISO 14001 certification acquisition status of Kawasaki's production sites is shown in Table 6 and the status of EMS establishment at subsidiaries is shown in tables 7 and 8. Following the revision of ISO 14001, all our certified business sites completed the transition to ISO 14001:2015 by the September 14, 2018 deadline.

The Head Office is advancing the collection and sharing of environmental data for sites using the EMS. In addition, the Head Office Environmental Management Division shares information with business sites and subsidiaries to further instill our environmental management policy throughout the Group. As part of these efforts, in fiscal 2018, the division visited all business sites to hear and share challenges while formulating the next (10th) three-year Environmental Management Activities Plan.

Table 6: ISO 14001 (JIS Q 14001) Certification Acquisition Status

Business segment		Date acquired	Registration
Ship & Offshore Structure Company		Aug. 2000	DNV GL
Rolling Stock Company		Feb. 2002	LRQA
Aerospace Systems Company	Aerospace Systems (Gifu)	Feb. 2002	BSK
	Jet Engine (Akashi)	Mar. 2000	BSK
Energy System & Plant Engineering Company	Plant Engineering	Nov. 1999	JQA
	Energy & Marine Machinery	Dec. 2000	NK
Motorcycle & Engine Company		Feb. 2000	DNV GL
Precision Machinery & Robot Company	Precision Machinery Business Division	Feb. 1998	DNV GL
	Robot Business Division	Mar. 2011	DNV GL

\* Certifying organizations: DNV GL: DNV GL Group; LRQA: Lloyd's Register Quality Assurance Limited; BSK: Defense Structure Improvement Foundation; JQA: Japan Quality Assurance Organization; NK: Nippon Kaiji Kyokai (ClassNK)

## Risk Management

In addition to approaches based on our risk management structures, we hold liaison conferences as needed for personnel with environmental responsibilities to ensure adherence to environmental laws and regulations, the dissemination and full understanding of legal revisions, and the enhancement of their capabilities. These conferences, which are held under the direction of the Head Office Environmental Management Division, serve as opportunities for working with Group personnel to preempt environmental accidents and other compliance-related problems.

In fiscal 2018, as there were no revisions to relevant laws, we did not implement any new risk countermeasures.

## Compliance with Laws and Regulations

The Kawasaki Group strives to implement environmental management activities in compliance with environmental laws and regulations.

There were no major violations in fiscal 2018. However, we received three complaints from neighboring residents about noise from factories. We resolved all of these by implementing noise control countermeasures and taking steps to prevent recurrences.

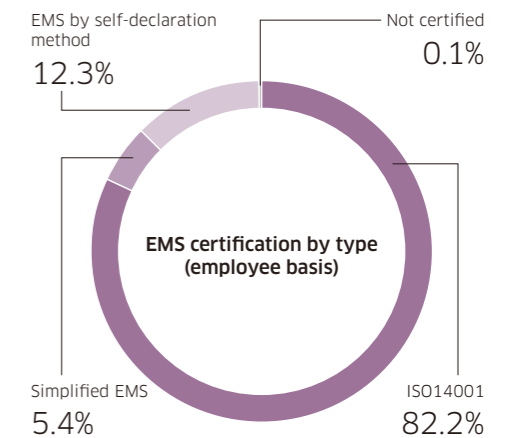


Figure 25: EMS Certification by Type within the Group (employee basis)

Note: The above figures are calculated as a percent of the number of consolidated Group employees.

**Table 7: Domestic Subsidiaries**

Oversight organization/Company	EMS level*/Date of establishment
<b>Aerospace Systems Company</b>	
Kawaju Gifu Engineering Co.,Ltd.	1 Feb. 2002
Kawaju Gifu Service Co., Ltd.	1 Feb. 2002
KGM Co., Ltd.	1 Feb. 2002
NIPPI Corporation	1 Dec. 2006
Kawaju Akashi Engineering Co., Ltd.	1 Mar. 2000
<b>Energy System &amp; Plant Engineering Company</b>	
Kawasaki Thermal Engineering Co., Ltd.	1 Apr. 2002
Kawasaki Machine Systems, Ltd.	1 Mar. 2000
Kawasaki Prime Mover Engineering Co., Ltd.	1 Dec. 2002
Kawasaki Naval Engine Service, Ltd.	3 Aug. 2016
KEE Environmental Construction, Co., Ltd.	1 Dec. 2003
EarthTechnica M&S Co., Ltd.	3 Apr. 2013
Kawasaki Environmental Plant Engineering Co., Ltd.	1 Jun. 2002
Kawaju Facilitch Co., Ltd.	2 Jul. 2013
Kawasaki Engineering Co., Ltd.	3 Oct. 2009
EarthTechnica Co., Ltd.	1 Sep. 2000
<b>Precision Machinery &amp; Robot Company</b>	
Kawasaki Hydromechanics Corporation	1 Jun. 2007
Kawasaki Robot Service, Ltd.	1 Apr. 2012
<b>Ship &amp; Offshore Structure Company</b>	
Kawaju Support Co., Ltd.	2 Dec. 2005
Kawasaki Marine Engineering Co., Ltd.	3 Apr. 2013
KHI JPS Co., Ltd.	3 Mar. 2008
<b>Rolling Stock Company</b>	
Alna Yusoki-Yohin Co., Ltd.	2 Nov. 2017
Kawasaki Rolling Stock Component Co., Ltd.	1 Aug. 2002
Kawasaki Rolling Stock Technology Co., Ltd.	1 Aug. 2002
Kansai Engineering Co., Ltd.	3 Aug. 2002
Sapporo Kawasaki Rolling Stock Engineering Co., Ltd.	2 Jun. 2011
NICHIJO CORPORATION	2 Oct. 2005
<b>Motorcycle &amp; Engine Company</b>	
Kawasaki Motors Corporation Japan	1 Feb. 2008
K-Tec Corp.	1 Dec. 2014
Technica Corp.	3 Mar. 2012
Autopolis	2 Dec. 2011
Union Precision Die Co., Ltd.	1 Jul. 2006
<b>Head Office</b>	
Kawasaki Trading Co., Ltd.	1 Dec. 2004
Kawaju Service Co., Ltd.	1 Feb. 2000
Kawasaki Technology Co., Ltd.	3 Oct. 2011
Kawasaki Life Corporation	2 Jul. 2006
K Career Partners Corp.	2 Mar. 2007
Benic Solution Corporation	2 Feb. 2006

\* EMS levels: Level 1: ISO 14001 registration; Level 2: Simplified EMS certification; Level 3: Self-declaration of EMS establishment

**Table 8: Overseas Subsidiaries**

Oversight organization/Company	Location	EMS level*/Date of establishment
<b>Energy System &amp; Plant Engineering Company</b>		
Kawasaki Gas Turbine Asia Sdn. Bhd.	Malaysia	3 Mar. 2013
Kawasaki Gas Turbine Europe GmbH	Germany	3 Mar. 2013
Wuhan Kawasaki Marine Machinery Co., Ltd.	China (PRC)	1 Jul. 2009
KHI Design & Technical Service Inc.	Philippines	3 Nov. 2011
<b>Precision Machinery &amp; Robot Company</b>		
Kawasaki Precision Machinery (Suzhou) Ltd.	China (PRC)	1 Dec. 2007
Kawasaki Precision Machinery (UK) Ltd.	UK	1 Nov. 2001
Kawasaki Chunhui Precision Machinery (Zhejiang) Ltd.	China (PRC)	1 Nov. 2012
Flutek, Ltd.	South Korea	1 Nov. 2005
Kawasaki Robotics (Tianjin) Co., Ltd.	China (PRC)	3 Nov. 2012
Kawasaki Robotics GmbH	Germany	3 Nov. 2012
Kawasaki Robotics (U.S.A.) Inc.	U.S.A.	1 Feb. 2006
<b>Rolling Stock Company</b>		
Kawasaki Rail Car, Inc.	U.S.A.	3 Jul. 2015
<b>Motorcycle &amp; Engine Company</b>		
Kawasaki Motors Corp., U.S.A.	U.S.A.	3 Mar. 2013
Kawasaki Motors Pty. Ltd.	Australia	3 Mar. 2013
PT. Kawasaki Motor Indonesia	Indonesia	3 Jan. 2012
Kawasaki Components da Amazonia Ltda	Brazil	3 Jun. 2013
Kawasaki Motores do Brasil Ltda.	Brazil	3 Jun. 2013
Kawasaki Motors Europe N.V.	Netherlands	3 Feb. 2014
Kawasaki Motors (Phils.) Corporation	Philippines	3 Jan. 2012
Kawasaki Motors Manufacturing Corp., U.S.A. (MRV)	U.S.A.	1 Nov. 2008
Kawasaki Motors Manufacturing Corp., U.S.A. (LNC)	U.S.A.	1 Apr. 2003
Kawasaki Motors Enterprise (Thailand) Co., Ltd.	Thailand	1 Dec. 2011
Canadian Kawasaki Motors Inc.	Canada	3 Feb. 2013
<b>Head Office</b>		
KHI (Dalian) Computer Technology Co., Ltd.	China (PRC)	3 May 2013

**Promoting Environmental Communication**

**Raising Environmental Awareness**

We are engaged in communications activities aimed at enhancing the perception and awareness of environmental issues among each and every employee of the Group. We conduct ongoing awareness raising activities, including the publication of environment-related articles in the Kawasaki Group internal bulletin (Figure 26), distribution of the President's message for Environment Month (Figure 27), and distribution of information (environmental data, case examples of energy saving, etc.; Figure 28) through our intranet, so that employees can put environmentally conscious activities into practice not only at the workplace, but also in their local communities and homes.

**Environmental e-Learning**

To maintain and improve environmental awareness among employees throughout the domestic Group, we offer environmental e-learning opportunities to new employees at both Kawasaki and domestic subsidiaries. In fiscal 2018, approximately 1,160 people completed such training.

**Cultivating Qualified Managers**

To enrich management activities emphasizing energy and the environment, we are striving to cultivate individuals with legal qualifications required under laws and regulations related to energy and the environment. The number of employees with qualifications in fiscal 2018 is shown in Table 9. In addition, as an internal qualification, we offer training for internal ISO 14001 environmental management and environmental auditors, through which approximately 120 employees acquired qualifications in fiscal 2018.

**Table 9: Employees with Legal Qualifications**

Pollution control managers	Air	94
	Water	77
	Noise, vibration	14
	Others	77
	Total	262
Energy managers		81



**Figure 26: Articles Featured in Internal Bulletins**



**Figure 27: President's Message on Environmental Management**



**Figure 28: Distribution of Information through Our Intranet**

## Heightened Awareness as an Environmentally Friendly Brand

Kawasaki believes that one of its important responsibilities is to make its environmental policies and initiatives easy to understand and to disclose those policies with transparency.

We conduct Kawasaki Green Product Promotion Activity, in which we register products based on an assessment of environment-related aspects of product performance and the manufacturing process. This activity is aimed at broadly communicating and instilling awareness of our support for the environment through our products.

In addition, we work to appropriately disclose information regarding our environmental activities to stakeholders through the *Environmental Report* and on our website, and by proactively responding to questionnaires, etc., from external evaluation organizations, such as CDP and the DJSI Asia Pacific Index.

### Key Strategies and Targets under the Ninth Environmental Management Activities Plan (FY2016–FY2018)

#### Heightened awareness as an environmentally friendly brand

- Targets**
- 1 Leverage Kawasaki Green Product Promotion Activity**
    - ▶ Register Kawasaki-brand Green Products every year and communicate data to public
  - 2 Enhance reputation through external evaluations and rankings**
    - ▶ Announce results of third-party verification, improve evaluations from external organizations such as CDP, and sustain placement in the DJSI Asia Pacific Index

### Kawasaki Green Product Promotion Activity

Kawasaki-brand Green Products is a program in support of the Group Mission, “Kawasaki, working as one for the good of the planet,” and aims to boost the environmental performance of products and accelerate the reduction of environmental impact caused by associated manufacturing processes. The products selected for this program must meet criteria established by the Company and are categorized as either Kawasaki Green Products or Kawasaki Super Green Products. The products thus categorized are then publicized in compliance with ISO 14021.

The program logo embodies the Group’s commitment to environmental sustainability through products and manufacturing. The Kawasaki Group’s primary business areas—land, sea, and air transport systems, energy and environmental engineering, and industrial equipment—each with innovative and advanced technological capabilities, form three solid pillars, which together support the global environment.



Figure 29: Program logo

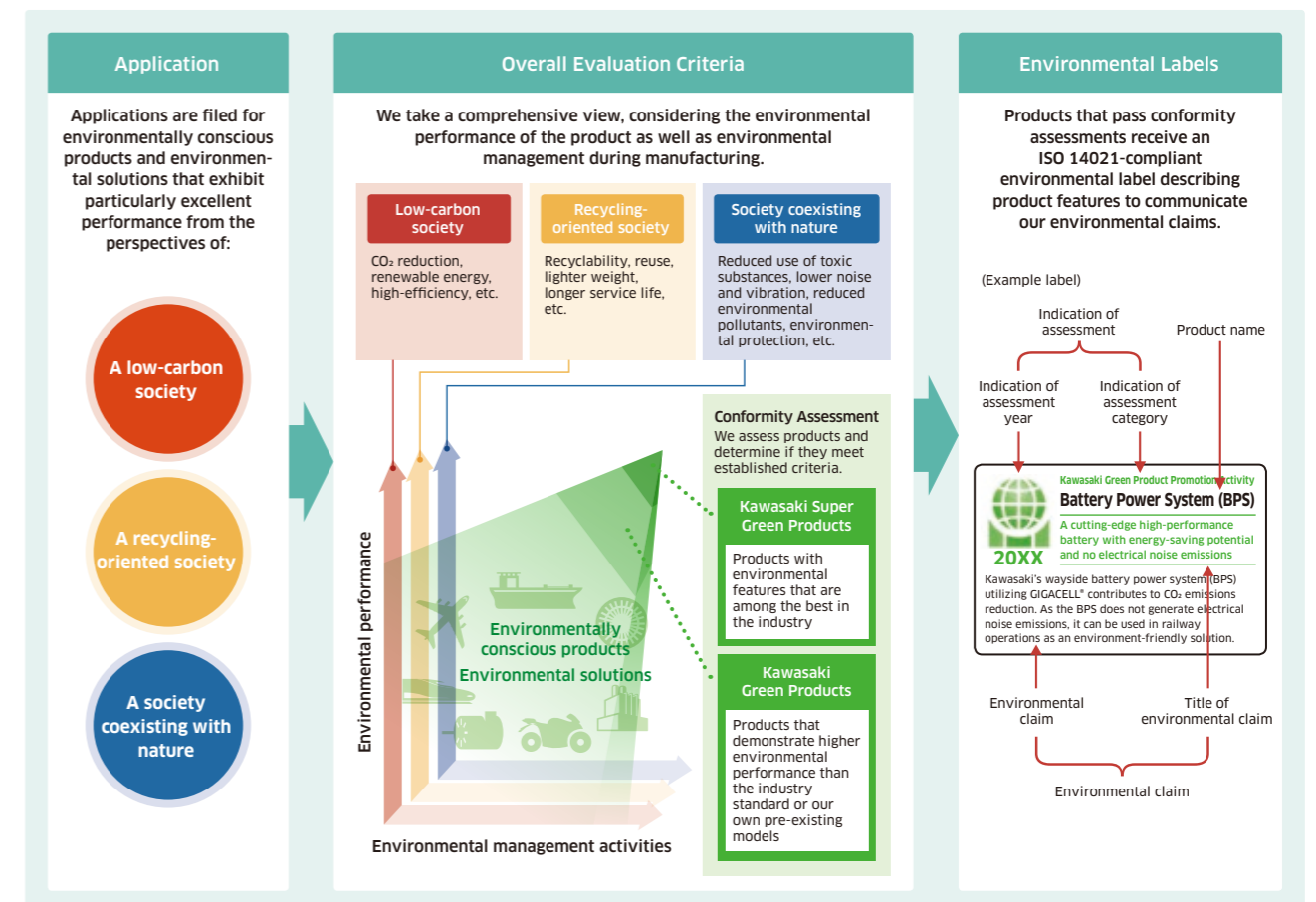


Figure 30: Conformity Assessment Procedure

## External Information Disclosure

Kawasaki discloses information about its environmental management activities to its stakeholders through means such as the *Kawasaki Report* (integrated report), the *Environmental Report* (this document), and its website. In addition, we receive questionnaires from many external evaluation organizations, including the CDP Climate Change Information Request conducted by the CDP; surveys from the DJSI Asia Pacific Index; the Environmental Survey conducted by Sampo Japan Nipponkoa Asset Management Co., Ltd. (SNAM); and the Toyo Keizai CSR Survey, conducted by Toyo Keizai Inc. We view these as the voice of stakeholders representing investors, and we proactively disclose environmental information by responding to such questionnaires.

In fiscal 2018, Kawasaki was once again selected for inclusion in the DJSI Asia Pacific Index and as a stock for investment by the SNAM Sustainable Investment Fund.

## Product Assessment

For newly developed and designed products, as well as for particularly important products, Kawasaki assesses products according to such criteria as resource and energy savings and recycling potential, with the goal of reducing the environmental impact of our products across their life cycles. Because specific evaluation techniques vary depending on the type of product, each business segment draws up product assessment rules appropriate to the characteristics of their respective products. The main items evaluated in product assessments are shown below.

- 1 Product weight reduction
- 2 Product energy saving
- 3 Longer product life
- 4 Product safety and environmental conservation effectiveness
- 5 Measures for product disposal and recycling
- 6 Environmental impacts when problems or other extraordinary circumstances occur
- 7 Provision of information for use and maintenance
- 8 Compliance with regulations

## 2019 Kawasaki-brand Green Products

### Newly Registered Products

### VEGA Boiler



Kawasaki Heavy Industries, Ltd.



**Improved power output and reduced boiler weight in a compact design**

A new heat transfer tube structure achieves better heat transfer as well as reductions in boiler weight and size. By adopting higher steam pressure and temperature, the VEGA boiler improves power output.



Metric	Competitor's boiler	VEGA Boiler
Gross power output	100%	111%
Boiler weight	100%	68%
Size	100%	60%

**Product Description**

A new type of boiler for waste heat recovery power generation systems at cement plants capable of covering approximately 30% of a plant's power requirements.

\*VEGA is an abbreviation of Vertical Exhaust Gas Advanced and a registered trademark of Kawasaki.

**Features**

- Utilizes hammering equipment that improves heat transfer and achieves highly effective dust removal
- Draft loss is approximately 75% lower than that of conventional Pre heater boilers, reducing induced draft fan power consumption
- Modular block design of heat transfer tubes shortens installation time approximately 25%

### U-KACC Boiler



Kawasaki Heavy Industries, Ltd.



**Efficiently burns combustion-resistant petroleum residues from oil refining with reduced emissions of environmental pollutants**

Kawasaki's proprietary KACC\* technology achieves industry-leading efficiency in burning combustion-resistant petroleum residues left over from oil refining, thereby reducing NOx and dust emissions.



Pollutant	Conventional boiler	U-KACC Boiler
NOx	100%	48% reduction
Dust	100%	22% reduction

**Product Description**

A boiler that can achieve mono-firing of combustion-resistant petroleum residues, such as petroleum coke and asphalt pitch, with no need for auxiliary fuel (electricity output: 36,000 kW)

**Features**

- The U-shaped flue gas flow at the furnace bottom encourages ash to separate from the flue gas
- Ash discharges from the furnace bottom, reducing ash adhesion to heat transfer surfaces and dust clogging



**Waste Carbonization System**

**2019 Kawasaki SUPER Green Product**

**Kawasaki Heavy Industries, Ltd.**

**Kawasaki Powering your potential**

Carbonizes municipal waste to produce a fossil fuel alternative for use in power generation

This system recovers unutilized energy from municipal waste by carbonizing said waste to produce fuel, a process that reduces CO<sub>2</sub> emissions by more than 40% compared with simple incineration. By applying a high-performance desalination process to prevent metal corrosion, the system produces a high-quality carbonized fuel that can be used in electricity generation, a first in Japan.

Annual CO<sub>2</sub> Emissions Assuming 50 tons of Waste Processed per Day

System	CO <sub>2</sub> Emissions (t-CO <sub>2</sub> /year)
Simple Incineration	~9,000
Carbonization system	~5,000

CO<sub>2</sub> emissions cut by more than 40%

**Product Description**  
A system that treats municipal waste and sludge to produce carbonized fuel that can be used at power generation facilities

**Features**

- Reduces the need for supplementary fuel by utilizing pyrolytic gas generated during waste carbonization
- Utilizes a cylindrical carbonization kiln divided into four quadrants to save space

**Small Payload Material Handling Robots RS007 Series**

**2019 Kawasaki Green Product**

**Kawasaki Heavy Industries, Ltd.**

**Kawasaki Powering your potential**

Boasting high-efficiency, high-speed operation with compact energy-saving designs

The use of a cantilever robotic arm structure and a reduction in the number of components used has resulted in slimmer, more compact forms while reducing lubricant required more than 70% and cutting energy consumption.

Metric	RS005L	RS007L	Improvement
Number of components	272	220	19%
Lubricant (ml)	686	193	72%
Power consumption (kW)	0.355	0.316	11%

**Product Description**  
General-purpose small payload robots offering industry-leading speed and a wide range of motion as well as greater installation flexibility; optimal for assembly and material handling operations

**Features**

- High-speed motion utilizing deflection-predictive vibrational control and speed and acceleration optimization control
- Internal Ethernet wiring enables easy connection to cameras and other devices, supporting flexible system design

**High-Pressure Hydrogen Regulator (KGPR65D)**

**2019 Kawasaki SUPER Green Product**

**Kawasaki Heavy Industries, Ltd.**

**Kawasaki Powering your potential**

A key component helping to bring CO<sub>2</sub>-free fuel cell vehicles (FCVs) to the road

The valve reduces the pressure of the hydrogen gas flow from the high-pressure storage tank for supply to the fuel cells that power FCVs. High-precision gas control technology achieves efficient depressurization and stable hydrogen gas pressure during power generation.

**Product Description**  
A valve that reduces the pressure of hydrogen gas supplied from FCV hydrogen tanks (at about 700 atm) to a level close to that usable by the fuel cell stack\*

**Features**

- Compliant with the EU's REACH Regulation on chemical substances and ELV Directive on vehicle disposability
- Improved compactness and energy efficiency help improve FCV cruising range
- High reliability: Clears a durability test simulating 20 years of use

**SOPass Ship Operation and Performance Analysis Support System**

**2019 Kawasaki SUPER Green Product**

**Kawasaki Heavy Industries, Ltd.**

**Kawasaki Powering your potential**

Weather routing and BOG\* management functions significantly reduce fuel consumption and improve transport efficiency

SOPass selects optimum routes under the relevant navigation limitations based on the motion and resistance of the ship and weather forecast information. As a result, equipping ships with SOPass reduces CO<sub>2</sub> emissions an average of 3%.

On LNG carriers, SOPass improves transport efficiency by using a thermal simulation model to estimate BOG volume and the amount of heel required for the next voyage.

\*BOG: Boil-off gas, natural gas that naturally evaporates during transport

**Product Description**  
A ship operation and performance analysis support system that helps ships operate efficiently using data analysis and predictive functions that combine data from ships with knowledge of naval architecture

**Features**

- Main functions: Weather routing, performance analysis, maintenance management, and BOG management
- Customers can select functions to meet their specific needs

**Kawasaki**  
Powering your potential

## Ninja ZX-6R (2019MY)

Offers the engine performance of the base model along with significantly improved fuel efficiency and reduced exhaust gas

The 2019 model boasts a more than 20% improvement in fuel efficiency compared with the base model. With reductions from the base model of more than 46% in exhaust gas and 6% in exhaust noise, this model meets the Euro 4 gas emissions regulation and new R41-04 noise regulation.

Model	CO	THC	NOx
Ninja ZX-6R (2019MY)	0.096	0.146	0.890
Ninja ZX-6R (2013MY)	0.134	0.180	0.950

Model	Fuel efficiency
Ninja ZX-6R (2019MY)	18.2
Ninja ZX-6R (2013MY)	14.9

Standards compliance:  
Ninja ZX-6R (2019MY): Euro 4  
Ninja ZX-6R (2013MY): Euro 3

WMTC: Worldwide-harmonized Motorcycle Test Cycle

**Product Description**  
The 636 cm<sup>3</sup> New Ninja ZX-6R, designed to let a wide range of users enjoy supersport driving on circuit courses and winding roads

**Features**

- Updated gear ratio to provide a more powerful feel and better engine handling in the low-RPM range
- Fully revamped next-generation Ninja styling, featuring LED head and tail lamps
- Adds a range of new features to the base model, including a quick upshifter, fuel gauge, and an accessory power tap

Kawasaki Heavy Industries, Ltd.

**Kawasaki**  
Powering your potential

## Versys 1000 (2019MY)

Keeps the power of the base model while boasting significantly reduced exhaust gas emissions

Compared with the base model, exhaust gas emissions have been reduced by more than 40%, bringing them well below the limits of Euro 5 emission regulations in advance.

Model	CO	THC	NOx
Versys 1000 (2019MY)	0.049	0.019	0.319
Versys 1000 (2015MY)	0.071	0.021	0.662

Standards compliance:  
Versys1000 (2019MY): Euro 5  
Versys1000 (2015MY): Euro 4

**Product Description**  
The newest version of the popular Versys 1000 multipurpose model, well suited for touring, with refined styling and full range of features

**Features**

- Improved brake pad and brake disc abrasion resistance
- Electronic throttle control system improves responsiveness, especially at slow and medium speeds, while maintaining smooth power delivery
- New inertial measurement unit (IMU) delivers more stable chassis control during cornering

Kawasaki Heavy Industries, Ltd.

### Renewed Registrations

After registration, products are reassessed every three years, and registration is renewed for products that meet the necessary criteria.

**Kawasaki**  
Powering your potential

## L30A-01D/DLH Gas Turbine

Offer the world's highest level electrical efficiency and NOx performance in Class. Allow for hydrogen mix combustion while controlling NOx emissions

Improve electrical efficiency to 40.2% and achieve a guaranteed NOx value of 0.06 ppm (Dry) (25°C) (25°C) (25°C) for hydrogen mix, with 60% hydrogen per natural.

**Product Description**  
Highly efficient gas turbine that allows mix combustion with hydrogen. The world's highest efficiency and ultra-low NOx emissions. High pressure ratio compressor. Improvements of components. High speed and low rotating speed. With power increased by 1.5 times. Reduced NOx emissions. Low temperature start-up. Hydrogen-mix combustion with hydrogen per natural.

**Special Features**

- World's highest electrical efficiency of 40.2% (hydrogen mix) class. Guaranteed value.
- With the world's lowest NOx emissions of 0.06 ppm (Dry) (25°C) (25°C) (25°C) for hydrogen mix. Guaranteed value.
- Reduced NOx emissions. Low temperature start-up. Hydrogen-mix combustion with hydrogen per natural.

2019 Kawasaki SUPER Green Product

Kawasaki Heavy Industries, Ltd.

**Kawasaki**  
Powering your potential

## CK Mill

Long lifetime CK Mill that achieved remarkable power savings and reduced vibrations

Energy consumption has been lowered by 20%-25%. Thanks to improved grinding energy efficiency. The weight and vibration level were reduced by around 20% and 50% respectively by enhancing the structure (substrate) for the main grinding mechanism from steel plate to concrete.

**Product Description**  
A high efficiency roller mill for green plants with high efficiency and low vibration. It offers significant reduction in power consumption and vibration during grinding process through machine structure and control system to meet the demand for high energy efficiency and low maintenance.

**Special Features**

- Advanced roller energy savings through improvement in configuration of grinding roller and the roller structure.
- Offers significant reduction in power consumption and vibration during grinding process through machine structure and control system to meet the demand for high energy efficiency and low maintenance.
- Highly resistant to wear. No need to conduct roller wear and surface of grinding roller and roller structure.

2019 Kawasaki Green Product

Kawasaki Heavy Industries, Ltd.

**Kawasaki**  
Powering your potential

## Medium-Diameter Shield Tunnel Boring Machine

Reduces construction period on tunnel projects and environmental impact. (Thanks to reuse of main components of shield tunnel boring machine and enhanced driving power efficiency)

Change jointing method for main structural parts from welded flange to bolted connection, thereby simplifying the work involved in construction, disassembly and repair of components. Switched cutter drive system from hydraulic to electric, improving overall torque by 20%.

**Product Description**  
A shield tunnel boring machine that features a unique jointing method for main structural parts from welded flange to bolted connection, thereby simplifying the work involved in construction, disassembly and repair of components. Switched cutter drive system from hydraulic to electric, improving overall torque by 20%.

**Special Features**

- Adopted jointing method for main structural parts from welded flange to bolted connection, thereby simplifying the work involved in construction, disassembly and repair of components.
- Switched cutter drive system from hydraulic to electric, improving overall torque by 20%.

2019 Kawasaki Green Product

Kawasaki Heavy Industries, Ltd.

**Kawasaki**  
Powering your potential

## Kawasaki Step Grate Parallel-Flow Incinerator

Significant reductions in blower power consumption and NOx exhaust concentration, and low air ratio operation made possible through Kawasaki's own parallel-flow incinerator

Air ratio has been trimmed down to below the existing level of 1.2 and exhaust NOx concentration lowered by about 25%.

**Product Description**  
The new incinerator for solid waste has a new grate mechanism, a new burner and a new air ratio control system. It features a new air ratio control system that allows for low air ratio operation and low exhaust NOx concentration.

**Special Features**

- Low air ratio of 1.2. Reduced exhaust NOx concentration. Low exhaust NOx concentration.
- Low exhaust NOx concentration. Low exhaust NOx concentration.

2019 Kawasaki Green Product

Kawasaki Heavy Industries, Ltd.

**Kawasaki**  
Powering your potential

## Control Valve KMX13RB

Control valve for hydraulic excavator, boasting greater fuel economy and power density that surpasses competitor's products

The KMX13RB control valve has been designed to provide greater fuel economy and power density than competitor's products. It features a new valve design and a new control system. It also has a new valve design and a new control system.

**Product Description**  
A control valve for hydraulic excavator that provides greater fuel economy and power density than competitor's products. It features a new valve design and a new control system. It also has a new valve design and a new control system.

**Special Features**

- Greater fuel economy and power density than competitor's products.
- New valve design and new control system.

2019 Kawasaki SUPER Green Product

Kawasaki Heavy Industries, Ltd.

**Kawasaki**  
Powering your potential

## Dual-Arm SCARA Robot: duAro

Easy-to-impliment, energy-saving robot that also contributes to resource savings in building a system

The duAro boasts excellent mechanical efficiency and contributes to energy saving operations across a wide range of applications. Safety features, which facilitate side-by-side work with humans, and low air facility help to make, simplify and reduce peripheral components, such as safety fences, boots and work light, thereby contributing to reduced use of resources in building a system.

**Product Description**  
An energy-saving robot that also contributes to resource savings in building a system. It features a new design and a new control system. It also has a new design and a new control system.

**Special Features**

- Excellent mechanical efficiency and energy saving operations.
- Safety features that facilitate side-by-side work with humans.
- Low air facility that helps to make, simplify and reduce peripheral components.
- Reduced use of resources in building a system.

2019 Kawasaki SUPER Green Product

Kawasaki Heavy Industries, Ltd.

**Active Suspension System**

**Compact, lightweight suspension system developed in-house to provide improved ride quality and lower energy consumption**

This active suspension system has been developed from ground up with the installation length contracted from 700mm to 500mm and the weight reduced from 70kg to 25kg. The system also features a 20% improvement in power consumption, better responsiveness and reduced noise/vibrations.

**2019 Kawasaki Green Product**  
Initial registration 2018

Kawasaki Heavy Industries, Ltd.

**Universal Controller**

**Built to common global specifications, this high-performance controller is the smallest and lightest in the industry**

It achieves dramatic reductions in electrical components of motor circuits, thanks to functional safety technology. Used as a controller for robots with payloads between 1kg and 500kg, it is the smallest and lightest controller in the industry.

**2019 Kawasaki SUPER Green Product**  
Initial registration 2018

Kawasaki Heavy Industries, Ltd.

**Z125/Z125PRO**

**Deliver sporty and powerful rides on top of excellent fuel performance and low exhaust emissions**

The Z125/Z125PRO offer a 13% increase in output from the 6881S, a 13% improvement in BSFC fuel economy, and significant reductions in carbon monoxide, total hydrocarbons and NOx in exhaust gas.

**2019 Kawasaki Green Product**  
Initial registration 2018

Kawasaki Heavy Industries, Ltd.

# Environmental Data

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Environmental Data by Business Site ..... 37

Gifu Works

Nagoya Works 1

Kobe Works

Hyogo Works

Nishi-Kobe Works

Seishin Works

Akashi Works

Kakogawa Works

Harima Works

Sakaide Works

Environmental Data of Subsidiaries ..... 39

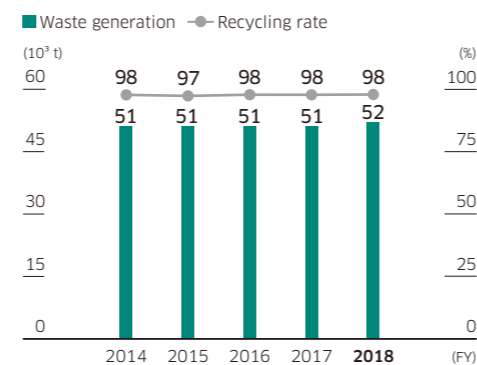
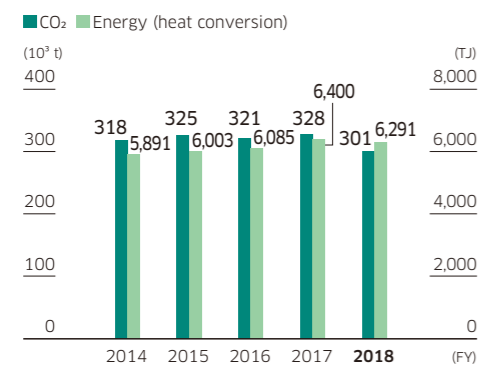
Domestic/Overseas

## Environmental Data for Kawasaki

### Fiscal 2018

		Unit	Company-wide	Comparison with fiscal 2017	
INPUT	Total energy (heat conversion)	TJ	6,291	98%	
	Purchased electricity	MWh	407,004	105%	
	Fuel	TJ	2,319	95%	
	Renewable energy	MWh	1,557	95%	
	Materials	10,000 t	11	79%	
	Water	1,000 m <sup>3</sup>	6,500	99%	
	OUTPUT	CO <sub>2</sub> emissions from energy sources	t	300,788	92%
SO <sub>x</sub>		t	2	72%	
Air		NO <sub>x</sub>	t	168	102%
		Soot and dust	t	6	136%
		PRTR regulated substances	t	686	79%
Water		Wastewater	1,000 m <sup>3</sup>	4,593	101%
		COD	t	6	79%
		Nitrogen	t	21	82%
		Phosphorus	t	Under 1	21%
		PRTR regulated substances	t	3	51%
Waste	Total emitted	t	52,464	102%	
	Recycled	t	51,262	102%	
	Others (incinerated/landfill)	t	1,202	97%	
	PRTR regulated substance in above total	t	283	111%	
Others	CO <sub>2</sub> emissions during transport	t	4,234	105%	

Note: For more details about financial information, including the net sales figures used to calculate per-unit information, please refer to the *Kawasaki Report*, Kawasaki's integrated report, which combines financial and non-financial information. [https://global.kawasaki.com/en/corp/ir/library/annual\\_report.html](https://global.kawasaki.com/en/corp/ir/library/annual_report.html)



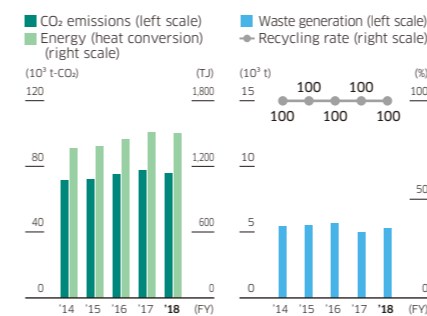
## Environmental Data by Business Site 1/2

### Fiscal 2018

		Unit	Gifu Works	Nagoya Works 1	Kobe Works	Hyogo Works	Nishi-Kobe Works	
INPUT	Total energy (heat conversion)	TJ	1,500	503	386	219	994	
	Purchased electricity	MWh	84,959	50,371	24,632	18,280	92,558	
	Fuel	TJ	678	12	145	41	91	
	Renewable energy	MWh	0	832	0	25	497	
	Water	1,000 m <sup>3</sup>	4,310	87	324	73	287	
Air	CO <sub>2</sub> emissions from energy sources	t	75,850	24,552	17,479	9,799	43,149	
	SO <sub>x</sub>	t	Under 1	Under 1	2	0	Under 1	
	NO <sub>x</sub>	t	42	5	80	Under 1	Under 1	
	Soot and dust	t	Under 1	Under 1	3	Under 1	Under 1	
	PRTR regulated substances	t	84	1	56	91	45	
	Water	Wastewater	1,000 m <sup>3</sup>	3,612	16	114	73	101
		COD	t	6	Under 1	Under 1	Under 1	Under 1
Nitrogen		t	20	Under 1	Under 1	Under 1	1	
Phosphorus		t	Under 1	Under 1	Under 1	Under 1	Under 1	
PRTR regulated substances		t	0	0	0	0	0	
Waste	Total emitted	t	5,296	1,067	9,953	4,406	7,502	
	Recycled	t	5,296	1,067	9,939	4,406	7,502	
	Others (incinerated/landfill)	t	0	0	14	0	0	
	PRTR regulated substances in above total	t	77	0	10	50	68	

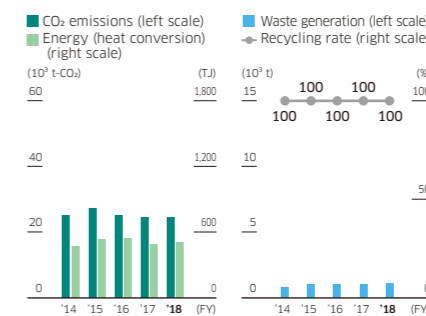
#### Gifu Works

**Location** 1, Kawasaki-cho, Kakamigahara, Gifu 504-8710, Japan  
**Main products** Transport airplanes, helicopters, spacecraft, component parts for airplanes



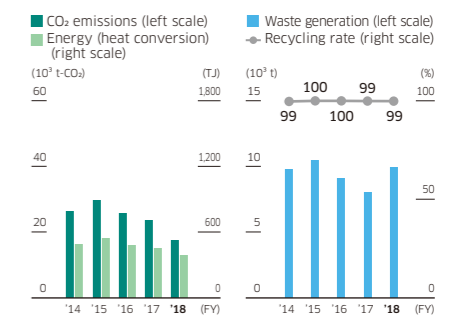
#### Nagoya Works 1

**Location** 20-3, Kusunoki 3-chome, Yatomi, Aichi 498-0066, Japan  
**Main products** Component parts for airplanes



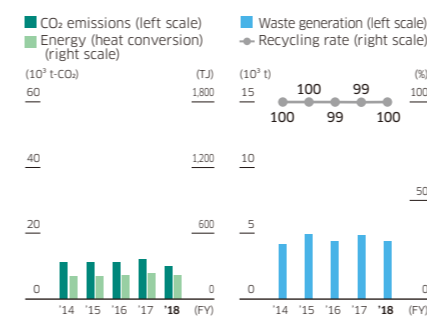
#### Kobe Works

**Location** 1-1, Higashikawasaki-cho 3-chome, Chuo-ku, Kobe, Hyogo 650-8670, Japan  
**Main products** Ships & maritime equipment, steam turbines for ground and maritime applications, diesel engines



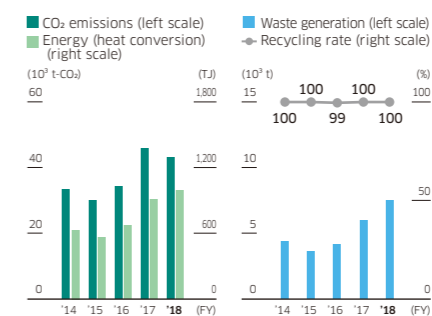
#### Hyogo Works

**Location** 1-18, Wadayama-dori 2-chome, Hyogo-ku, Kobe, Hyogo 652-0884, Japan  
**Main products** Rolling stock, automated guideway transit systems, platform screen doors



#### Nishi-Kobe Works

**Location** 234, Matsumoto, Hazetani-cho, Nishi-ku, Kobe, Hyogo 651-2239, Japan  
**Main products** Various hydraulic systems for industrial use, marine machinery, precision machinery and equipment



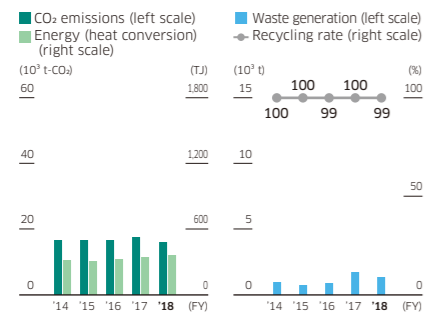
## Environmental Data by Business Site 2/2

### Fiscal 2018

	Unit	Seishin Works	Akashi Works	Kakogawa Works	Harima Works	Sakaide Works	
INPUT	Total energy (heat conversion)	TJ	360	1,681	133	153	324
	Purchased electricity	MWh	28,849	55,326	6,432	12,509	30,507
	Fuel	TJ	79	1,141	71	31	26
	Renewable energy	MWh	0	152	0	4	46
	Water	1,000 m <sup>3</sup>	109	786	12	77	436
OUTPUT	CO <sub>2</sub> emissions from energy sources	t	15,913	81,488	6,119	6,843	17,810
	SO <sub>x</sub>	t	0	0	0	Under 1	0
	NO <sub>x</sub>	t	2	10	0	Under 1	29
	Soot and dust	t	0	2	0	Under 1	Under 1
	PRTR regulated substances	t	3	46	0	36	324
	Wastewater	1,000 m <sup>3</sup>	67	541	5	29	35
	COD	t	-	-	Under 1	Under 1	Under 1
	Nitrogen	t	-	-	Under 1	Under 1	Under 1
	Phosphorus	t	-	-	Under 1	Under 1	Under 1
	PRTR regulated substances	t	0	2	0	0	0
Waste	Total emitted	t	1,334	8,341	2,361	2,207	9,997
	Recycled	t	1,334	8,336	2,357	2,207	8,819
	Others (incinerated/landfill)	t	0	5	4	0	1,178
	PRTR regulated substances in above total	t	9	51	0	5	13

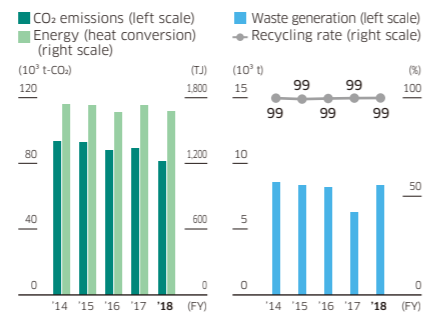
#### Seishin Works

**Location** 8-1, Takatsukadai 2-chome, Nishi-ku, Kobe, Hyogo 651-2271, Japan  
**Main products** Component parts for jet engines and gas turbines



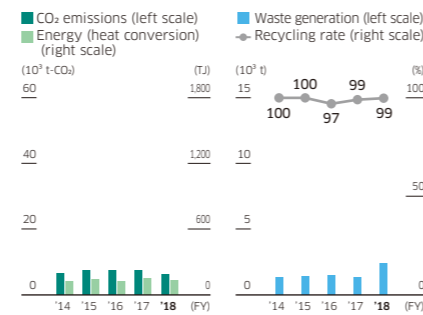
#### Akashi Works

**Location** 1-1, Kawasaki-cho, Akashi, Hyogo 673-8666, Japan  
**Main products** Motorcycles, general-purpose gasoline engines, industrial robots, jet engines, industrial gas turbines



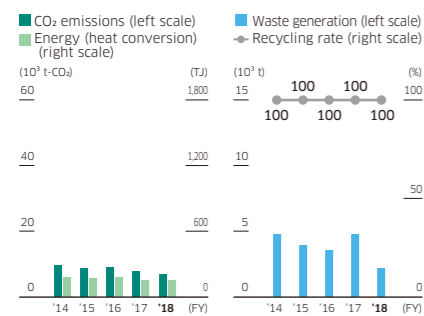
#### Kakogawa Works

**Location** 170, Yamanoue Mukohara, Hiraoka-cho, Kakogawa, Hyogo 675-0112, Japan  
**Main products** Cast aluminum motorcycle components



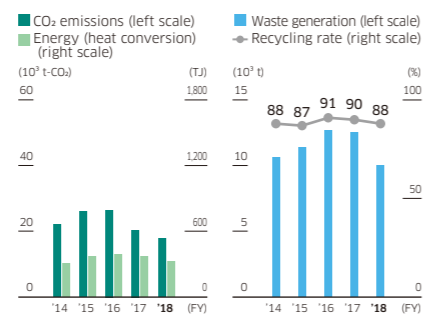
#### Harima Works

**Location** 8, Nijijima, Harima-cho, Kako-gun, Hyogo 675-0180, Japan  
**Main products** Industrial plants & environmental conservation facilities, boilers, construction machinery, rolling stock



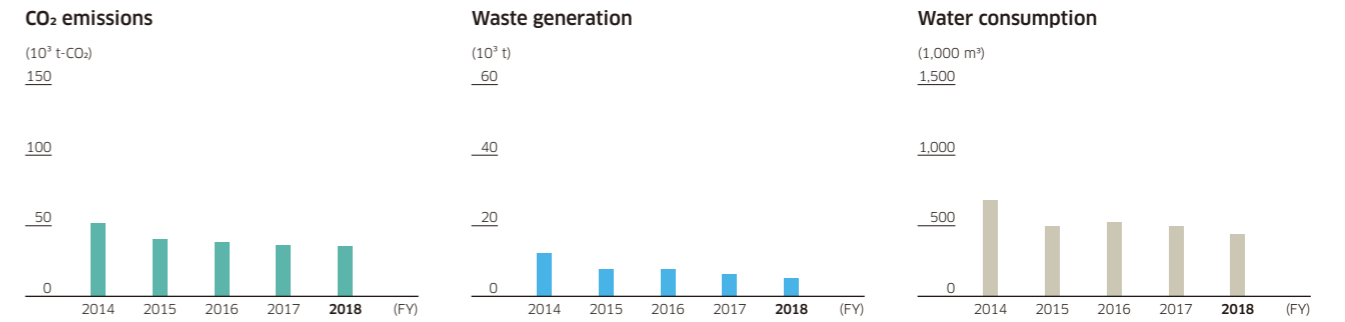
#### Sakaide Works

**Location** 1, Kawasaki-cho, Sakaide, Kagawa 762-8507, Japan  
**Main products** Ships & maritime equipment (LNG carriers, LPG carriers, container ships, etc.)

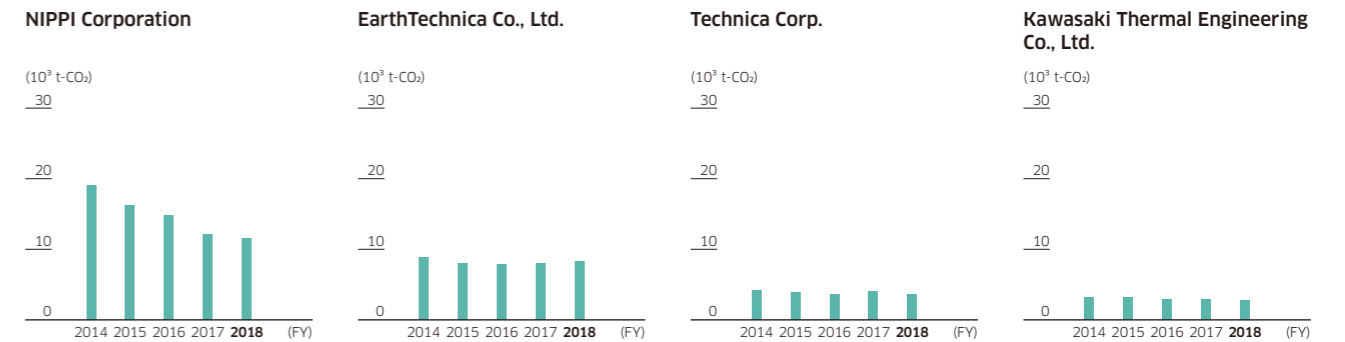


## Environmental Data of Subsidiaries

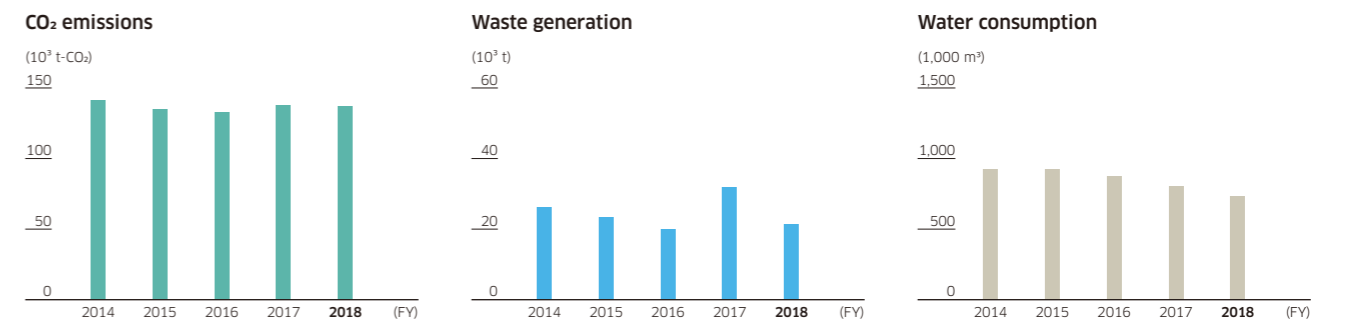
### Total for Domestic Subsidiaries



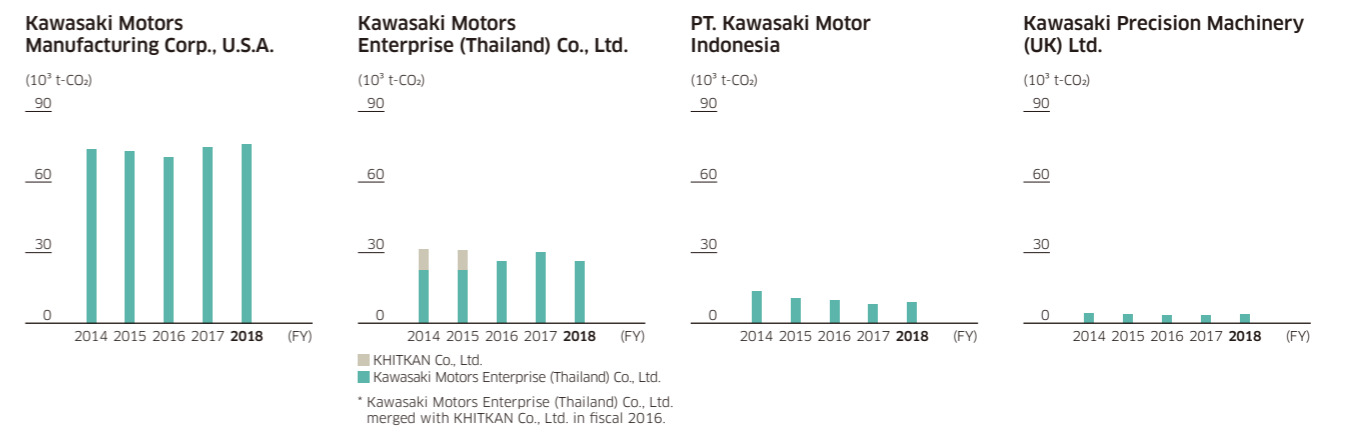
### CO<sub>2</sub> Emissions of Domestic Major Subsidiaries



### Total for Overseas Subsidiaries



### CO<sub>2</sub> Emissions of Major Overseas Subsidiaries



## Third-Party Verification of Greenhouse Gas Emissions

For the purpose of ensuring credibility, the Kawasaki Group received a third-party verification from SGS Japan Inc. of its greenhouse gas emissions data.

### Scope of Verification

Greenhouse gas emissions associated with business activities in fiscal 2018

- Scope 1 and 2 greenhouse gas emissions associated with business activities at Kawasaki and 20 domestic and 24 overseas subsidiaries
- Category 1 (purchased products and services) and Category 11 (use of sold products) greenhouse gas emissions, which account for a large percentage of Kawasaki's Scope 3 emissions

