



# Kawasaki

Environmental  
Report 2013

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## Editorial Notes

### Period

The report covers fiscal 2013 (April 1, 2012 to March 31, 2013). 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 country of location.

### Scope

Kawasaki Heavy Industries, Ltd. (including consolidated subsidiaries for some data).

**Frequency of issue:** The report is intended as an annual publication to be issued once every year.

**Edited and issued by:** CSR Division/Environmental Affairs Department

**Editorial responsibility:** General Manager, CSR Division

### Guidelines

In preparing the report, the editorial office referred to the Environmental Reporting Guidelines (2012 Edition) issued by the Ministry of the Environment and the Sustainability Reporting Guidelines (G3.1 ver.) issued by the Global Reporting Initiative (GRI).

### Disclaimer

This report not only describes actual past and present conditions at the KHI 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 the features of future business operations may differ from the content of such statements.

## Promoting Environmental Management

### Formulating Our Eighth Environmental Management Activities Plan



**Yoshizumi Hashimoto**  
Chief Environmental Officer,  
Executive Officer, General Manager, CSR Division

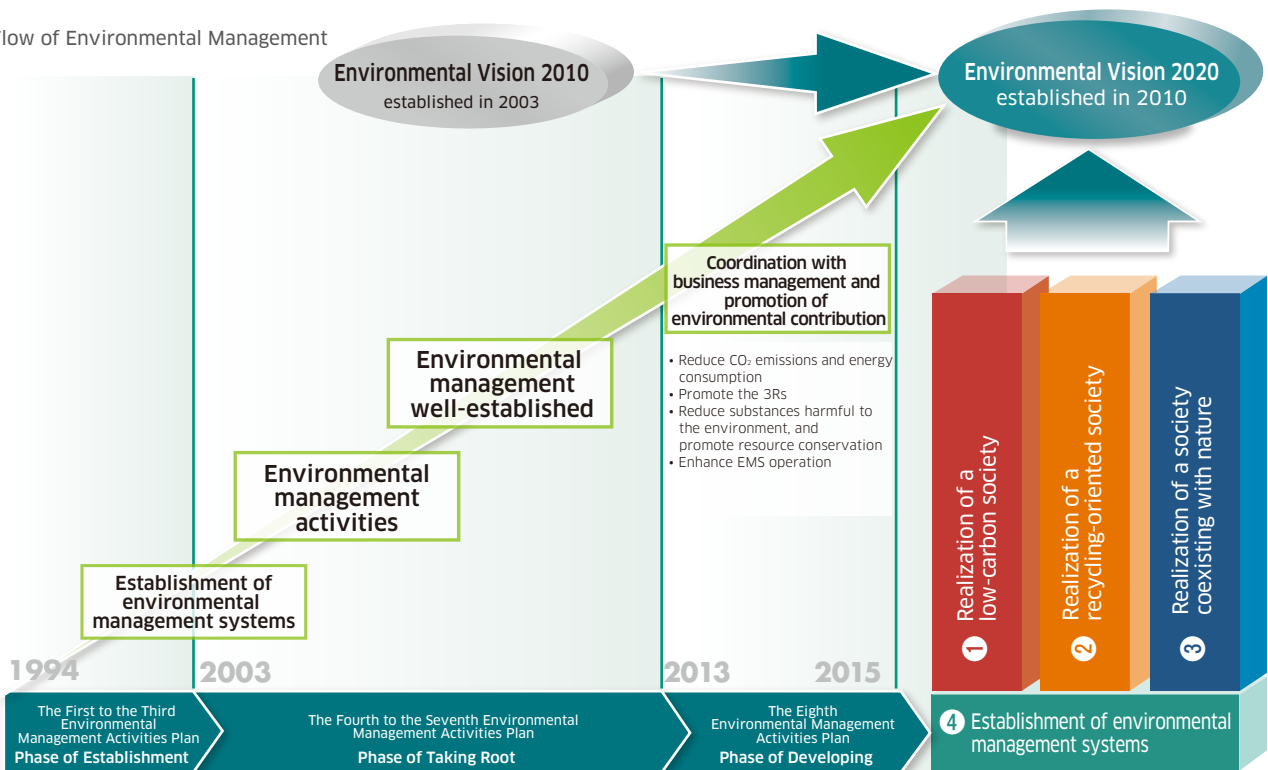
In fiscal 2011, the KHI Group drafted Environmental Vision 2020, which seeks to define the Group's identity in 2020 from an environmental perspective in line with the KHI's Group Mission: "Kawasaki, working as one for the good of the planet (Enriching lifestyles and helping safeguard the environment: Global Kawasaki)." Efforts to achieve this vision will be supported by plans on environmental management activities, which run for three years.

Fiscal 2014 is the first year of our Eighth Environmental Management Activities Plan, which covers the period to the end of fiscal 2016. In formulating the plan, the key strategies and targets were set with the aim of coordinating business management with environmental management: a basic policy of our Medium-term Business Plan 2013, which covers the same period from fiscal 2014 to fiscal 2016.

The Great East Japan Earthquake, which struck on March 11, 2011, has produced a shift in the domestic energy balance. In response, greenhouse gas reduction targets for 2013 and subsequent years have been subjected to fundamental revision as part of the range of new Japanese government policies now being formulated to achieve a sustainable society. In response, the KHI Group seeks to adopt strategies that anticipate society's environmental needs. Specifically, it will adopt the following key strategies: reduction in energy consumption and CO<sub>2</sub> emissions; promotion of the 3Rs (reduction of waste generation, reuse, and recycling); reduction of substances harmful to the environment and promotion of resource conservation. In each of these areas, we will work to meet new targets.

Concurrently, we will move to enhance the level of environmental management Group-wide including major overseas consolidated subsidiaries, and take steps to reduce environmental risks throughout the supply chain as well as value chain as part of the steady efforts to achieve Environmental Vision 2020.

Flow of Environmental Management



## Eighth Environmental Management Activities Plan (FY2014–2016)

The Eighth Environmental Management Activities Plan (referred to below as the Eighth Plan), covering the period from fiscal 2014 to fiscal 2016, lays down a basic policy for coordinating environmental management with business management and promoting the KHI Group's environmental contribution. By setting key strategies and the Eighth Plan targets for the fulfillment of this policy to anticipate society's environmental needs, we will accelerate progress in energy saving and resource saving. In concrete terms, the four key strategies we will pursue are (1) realization of a low-carbon society, (2) realization of a recycling-oriented society, (3) realization of a society coexisting with nature, and (4) establishment of environmental management systems (EMS). Along these lines, we will roll out activities to achieve our Environmental Vision 2020.

### Coordination with Business Management and Promotion of Environmental Contribution

#### Key strategy

##### Realization of a low-carbon society

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

##### Realization of a recycling-oriented society

Promotion of the 3Rs

##### Realization of a society coexisting with nature

Reduction of environmental load/promotion of resource conservation

##### Establishment of environmental management systems

Enhancement of the KHI Group environmental management system

#### Eighth Plan targets

##### Use the energy visualization system

By fiscal 2016, reduce annual CO<sub>2</sub> emissions and energy consumption by at least 5%

##### Reduce CO<sub>2</sub> emissions through the contribution from products

Achieve cumulative values at least equal to the initial plan values for each business segment

##### Promote the 3Rs in the areas of waste management (reduction of waste generation, reuse, recycling)

Reduce total waste emissions per unit of sales, and maintain zero emissions

##### Promote PCB treatment

Advance with the treatment of high-concentration PCB\*<sup>1</sup> waste and low-concentration PCB waste

##### Reduce chemical substances

Major VOCs\*<sup>2</sup> per unit of sales for each fiscal year to be at or below the average of results achieved in the Seventh Plan

##### Continue with forest conservation activity

Carry out forest conservation activity more than twice a year

##### Reinforce the environmental management ability of KHI and consolidated subsidiaries in Japan

Set reduction targets, and provide appropriate feedback

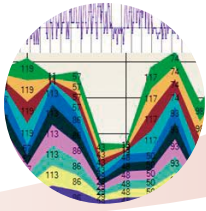
##### Reinforce the environmental management ability of overseas consolidated subsidiaries

Identify overseas laws and regulations and other requirements, and support environmental risk reduction

\*1 PCB: Polychlorinated biphenyl

\*2 VOC: Volatile organic compound. For the KHI Group, the major VOCs are toluene, xylene and ethylbenzene.

### Target Profile of the KHI Group in 2020



- **Energy consumption and CO<sub>2</sub> emissions**  
Major reductions achieved
- **Contribution from products**  
Major reductions achieved in CO<sub>2</sub> emissions during utilization



- **3Rs**  
Major reductions achieved per unit of sales  
Recycling rate more than 97%  
Zero emissions maintained
- **PCB treatment**  
All treatment completed



- **Major VOCs**  
Major reductions achieved per unit of sales and in total amount
- **Heavy metals**  
Major reduction in amount utilized
- **Forest conservation activity**  
Forest conservation activity continued



- **Establishment of EMS**  
Establishment completed across the KHI Group as a whole

## Group Mission

“Kawasaki, working as one for the good of the planet”

### Environmental Vision 2020

#### Realization of a low-carbon society

Contribute to the prevention of global warming through our products and manufacturing that use energy without waste

- ① Reduce 2020 greenhouse gas emissions in line with national targets.
- ② Offer customers energy-efficient products and services and reduce emissions of greenhouse gases on a planetary scale.
- ③ Promote energy conservation in production and logistics processes and reduce emissions of greenhouse gases.

#### Realization of a recycling-oriented society

Engage in manufacturing that uses resources without waste to recycle and fully utilize limited resources

- ① Practice design that uses resources effectively and work to make products lighter, more durable and more recyclable.
- ② Practice the 3Rs (reduce, reuse and recycle of waste) in production activities and achieve zero emissions at all plants.
- ③ Completely and appropriately treat all PCB waste and PCB-containing devices.

#### Realization of a society coexisting with nature

Contribute to reduction of the environmental impact and conservation of the ecosystem through manufacturing that is in harmony with the global environment

- ① Offer customers products and services that prevent air and water pollution, and advance environment improvements and ecosystem protection.
- ② Reduce the use of chemical substances in products and production activities.
- ③ Cooperate in regional forest conservation and other activities to protect the environment of ecosystems.

#### Establishment of environmental management systems

Build a foundation for environmental management that will achieve the Environmental Vision 2020

- ① Establish EMS at all consolidated subsidiaries in Japan and overseas to promote environmental management Group-wide.
- ② Comply with environmental laws and regulations and regularly follow up on compliance status.
- ③ Communicate environmental data within and beyond the Group and maintain two-way dialogue while protecting the environment.

## Seventh Environmental Management Activities Plan (FY2011–2013): Fiscal 2013 Results and Evaluation

The KHI Group engages in business founded on the need to promote the advancement of society and the nation through manufacturing, and it has sought to develop a global enterprise in key industries related to land, sea and air. To integrate these activities with the resolution of global environmental problems, we are working in terms of four themes: realization of a low-carbon society; realization of a recycling-oriented society; realization of a society coexisting with nature; and establishment of EMS in our Seventh Environmental Management Activities Plan (fiscal 2011 to fiscal 2013; referred to as the Seventh Plan). In the table below, we present the results of our activities in fiscal 2013 and an evaluation of the Seventh Plan.

### Seventh Environmental Management Activities Plan (FY2011–2013)

#### Realization of a Low-Carbon Society

Contribute to the prevention of global warming through our products and manufacturing that use energy without waste.

##### 1. Global warming prevention measures

- 1) Reduce CO<sub>2</sub> emissions from our own production activities; make CO<sub>2</sub> more tangible to promote energy-saving activities Group-wide; create a verification system
  - Undertake Group-wide CO<sub>2</sub> reduction measures (energy-saving capital investment)
  - Promote energy savings from logistics as a specified consignor
- 2) Acquire emissions credits with KHI Group products and technologies
  - Create a system to acquire emissions credits with the KHI Group products and technologies in Japan and abroad (e.g., CDM)
- 3) Purchase emissions credits from the trading market
  - Take precautionary measures in the event that we do not meet CO<sub>2</sub> reduction targets
- 4) Acquire emissions credits through endowment or donation

#### Group target

By fiscal 2013, reduce our average amount of CO<sub>2</sub> emission per unit of sales (CO<sub>2</sub> emissions per net sales) for fiscal 2009 through fiscal 2013 by 10%, compared with fiscal 2008

#### Realization of a Recycling-Oriented Society

Engage in manufacturing that uses resources without waste to recycle and fully utilize limited resources.

##### 1. Activities to reduce total waste emissions

- 1) Promote resource savings and the 3Rs (reduction of waste generation, reuse, and recycling)
- 2) Zero emissions activities, increasing recycling rate

#### Group target

By fiscal 2013, reduce waste basic unit (waste emissions per net sales) by 12%, compared with fiscal 2003; maintain zero emissions

##### 2. Decide on proper treatment (decomposition) plans for PCB waste and follow through with appropriate measures

#### Realization of a Society Coexisting with Nature

Contribute to reduction of the environmental impact and conservation of the ecosystem through manufacturing that is in harmony with the global environment.

##### 1. Activities to reduce chemical substances

- Set reduction targets and promote activities (both design and production initiatives)

#### Group target

Set the controlled chemical substances reduction target for fiscal 2011 through fiscal 2013, compared with the average for fiscal 2004 through fiscal 2006

##### 2. Environmental contributions through products and technologies

- 1) Activities to reduce the environmental impact over the product life cycle
  - Prepare a foundation for performing product life cycle assessment
- 2) Make products greener, and promote environmental consciousness in products

##### 3. Reduce the impact on and conserve biodiversity

- 1) Decide on biodiversity action guidelines and promote conservation

#### Establishment of Environmental Management Systems

Build a foundation for environmental management that will achieve the Environmental Vision 2020

##### 1. Formulate EMS for the KHI Group

#### Group target

By fiscal 2013, finish formulating EMS at factories and consolidated subsidiaries in Japan and abroad that are key production bases

##### 2. Comply thoroughly with environmental laws and regulations

- Prevent a recurrence of environmental accidents, etc.

##### 3. Practice environmental communication

- Promote an environmental dialogue with all stakeholders

## Main Strategies of the Seventh Environmental Management Activities Plan

<b>Realization of a low-carbon society</b>	We will take concrete action in the form of measures to counter global warming as a step toward meeting the Group-wide greenhouse gas target for the period up to fiscal 2013, which is to achieve a 10% reduction from fiscal 2008 levels in average emissions per unit of sales for the fiscal years 2009 to 2013.
<b>Realization of a recycling-oriented society</b>	To reduce total waste emissions, we will continue working Group-wide on activities such as resource-saving and promotion of the 3Rs (reduction of waste generation, reuse, and recycling).
<b>Realization of a society coexisting with nature</b>	We will continue promoting action to reduce chemical substances, environmental contribution through products and technology, etc.
<b>Establishment of environmental management systems</b>	As well as promoting the establishment of EMS at domestic and overseas consolidated subsidiaries, we will also take action on environmental risk management and environmental education for employees.

Results of Fiscal 2013 Activities	Evaluation of the Seventh Plan
1. Global warming prevention measures 1) Reduction of CO <sub>2</sub> emissions through our production activities <ul style="list-style-type: none"> <li>• The target for average emissions per unit of sales was not met; excess emissions were covered by CO<sub>2</sub> credits</li> <li>• The effectiveness of the energy visualization system was confirmed at a pilot factory</li> <li>• Energy-saving facilities were introduced and their efficacy verified</li> </ul> 2) Delivery of energy-efficient products <ul style="list-style-type: none"> <li>• CO<sub>2</sub> emissions reduction through products totaled approximately 500,000t-CO<sub>2</sub></li> </ul> 3) Purchase of carbon credits on the market <ul style="list-style-type: none"> <li>• CO<sub>2</sub> credits were acquired through the Japanese domestic emissions credit system</li> </ul> 4) Acquisition of emissions credits through donations and other voluntary activities <ul style="list-style-type: none"> <li>• A CO<sub>2</sub> Removal Certificate was received for forest conservation activities</li> </ul>	○
1. Activities to reduce total waste emissions 1) Total emissions per unit of sales were reduced by 23% and the target was therefore met 2) Zero emission status was maintained with a final disposal ratio of 1% or below	○
2. Formulation and monitoring of plans for appropriate treatment of PCB waste 1) For equipment containing high concentrations of PCB, commissioning of treatment to the Japan Environmental Safety Corporation (JESCO) was begun 2) For equipment containing low concentrations of PCB, a survey of treatment trends has been conducted	○
1. Activities to reduce chemical substances 1) Target setting for both design and production operations <ul style="list-style-type: none"> <li>• Introduction of low-VOC paints and heavy metal-free paints progressed, but some targets were not met</li> </ul>	△
2. Environmental contribution through products and technology <ul style="list-style-type: none"> <li>• Environmental load reduction was promoted through production activities and products</li> <li>• A full response was ensured to chemical substance-related laws and regulations (the ELV Directive, the RoHS Directive, the REACH Regulation, etc.)</li> <li>• Information was provided on our environmental contribution through products and technology</li> </ul>	○
3. Preservation of, and reduction of impact on biodiversity <ul style="list-style-type: none"> <li>• Forest conservation activities by employees and their families continued in Hyogo, Kochi, and Miyagi prefectures</li> </ul>	○
1. Establishment of EMS for the KHI Group 1) Formulation and implementation of EMS establishment plan at Japanese and overseas consolidated subsidiaries <ul style="list-style-type: none"> <li>• EMS was established at our main consolidated subsidiaries in Japan and overseas</li> </ul> 2) Collection of key environmental data for the whole Group <ul style="list-style-type: none"> <li>• An IT-based data collection system was established at domestic affiliated companies</li> <li>• Surveys were conducted at overseas affiliated companies to the application situation regarding compliance with laws and regulations and the environmental load</li> </ul>	△
2. Ensuring compliance with environmental laws and regulations 1) Monitoring of compliance with environmental laws and regulations, etc. 2) Group-wide provision of information on the enactment and revision of environmental laws and regulations	○
3. Promoting environmental communication 1) Implementation of environmental e-learning, and internal environmental auditor training 2) Provision of environmental information within and beyond the Group (CSR Report, etc.)	○

○ : achieved , △ : partly not achieved, × : not achieved

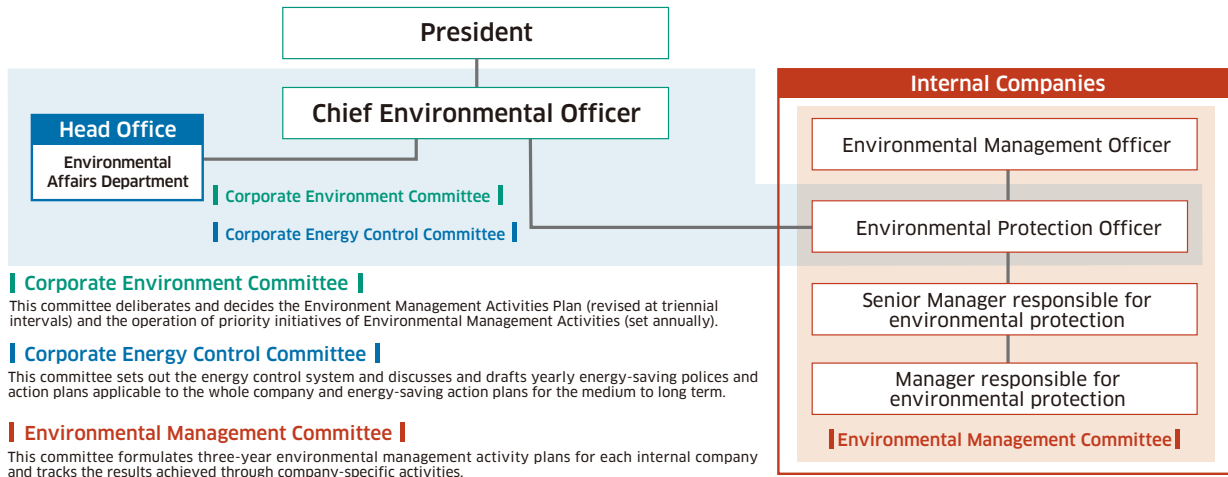
## Building an Environmental Management Platform

### Environmental Management Organization

The director for environmental issues at KHI is appointed the Chief Environmental Officer and in this position chairs the Corporate Environment Committee, which deliberates and formulates policy on a variety of important matters related to the environment. To enable each internal company to independently promote the environmental management activities plan as formulated, an Environmental Management Officer, an Environmental Protection Officer, a Senior Manager responsible for

environmental protection, and a Manager responsible for environmental protection are appointed to match the structure of each internal company with such activities. Furthermore, organization systems are in place to facilitate coordinated efforts among all employees to implement environment-oriented initiatives.

In addition, to promote energy management, an energy management structure was put in place from 2010 to roll out activities similar to those in environmental management.



### EMS at the KHI Group

Under the Seventh Plan, action was progressed on the basis of an EMS establishment plan drawn up for domestic and overseas consolidated subsidiaries. Main consolidated subsidiaries covered by the plan each completed the establishment of EMS. At consolidated subsidiaries which have completed the establishment of EMS, the collection of key environmental data has begun.

### EMS Establishment Status at KHI

All KHI production bases have acquired ISO 14001 certification.

Current Situations for Acquiring ISO 14001 (JIS Q 14001) Certification for KHI Production Bases

Internal companies		Date acquired	Registration
Ship & Offshore Structure Company	Kobe Works	Aug. 2002	DNV
	Sakaide Works	Aug. 2000	DNV
Rolling Stock Company		Feb. 2002	LRQA
Aerospace Company		Feb. 2002	BSK
Gas Turbine & Machinery Company	Gas Turbine Division	Mar. 2000	LRQA
	Machinery Division	Dec. 2000	NK
Plant & Infrastructure Company		Nov. 1999	JICQA
Motorcycle & Engine Company		Feb. 2000	DNV
Precision Machinery Company	Nishi-Kobe Works	Feb. 1998	DNV
	Robot Division	Mar. 2011	DNV

LRQA: Lloyd's Register Quality Assurance, JICQA: JIC Quality Assurance, NK: Nippon Kaiji Kyokai (ClassNK), BSK: Bouei Kiban Seibi Kyoukai (Defences Structure Improvement Foundation), DNV: Det Norske Veritas



## EMS Establishment Status at Domestic Consolidated Subsidiaries

The establishment of EMS at all domestic consolidated subsidiaries, which was targeted under the Seventh Plan, has been completed, either through acquisition of ISO 14001 registration, acquisition of EMS certification by another body, or self-declaration.

Under the Eighth Plan, we will work to enhance the EMS of domestic consolidated subsidiaries. From fiscal 2013, we began data collection under the EMS by extending the scope of data collection by our IT systems to include domestic consolidated subsidiaries.

### Domestic Consolidated Subsidiaries

Oversight organization	Company	Establishment level*	Date of establishment
Ship & Offshore Structure Company	Kawasaki Techno Wave Co., Ltd.	1	Aug. 2000
	Kawaju Support Co., Ltd.	2	Dec. 2005
	Kawaju Marine Engineering Co., Ltd.	3	Apr. 2013
	KHI JPS Co., Ltd.	3	Mar. 2008
Rolling Stock Company	Alna Yusoki-Yohin Co., Ltd.	1	Nov. 2008
	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 Manufacturing Co., Ltd.	2	May 2010
Aerospace Company	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
Gas Turbine & Machinery Company	Kawaju Akashi Engineering Co., Ltd.	1	Mar. 2000
	Kawasaki Thermal Engineering Co., Ltd.	1	Apr. 2002
	Kawasaki Machine Systems, Ltd.	2	Dec. 2011
	Kawasaki Prime Mover Engineering Co., Ltd.	1	Dec. 2002
	Kawasaki Naval Engine Service, Ltd.	1	Dec. 2002
Plant & Infrastructure Company	KEE Environmental Construction, Co. Ltd.	1	Dec. 2003
	EarthTechnica M&S Co., Ltd.	3	Apr. 2013
	KEE Environmental Service, Ltd.	1	Jun. 2002
	Kawaju Facilitech Co., Ltd.	3	Apr. 2013
	Kawasaki Engineering Co., Ltd.	3	Oct. 2009
Motorcycle & Engine Company	EarthTechnica Co., Ltd.	1	Sep. 2000
	Kawasaki Motors Corporation Japan	1	Feb. 2008
	K-TEC Corporation	3	Dec. 2009
	Technica Corp.	3	Feb. 2012
	Autopolis	2	Dec. 2011
Head Office	Union Precision Die Co., Ltd.	1	Jul. 2006
	Kawasaki Trading Co., Ltd.	1	Dec. 2004
	Kawaju Service Co., Ltd.	1	Feb. 2000
	Kawasaki Technology Co., Ltd.	3	Mar. 2005
	Kawasaki Life Corporation	2	Jul. 2006
	Kawasaki Hydromechanics Corp.	1	Jun. 2007
	K Career Partners Corp.	2	Mar. 2007
	Benic Solution Corp.	2	Feb. 2006
	KCM Corporation	1	May 2000
KCMJ	2	Mar. 2012	

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

## EMS Establishment Status at Overseas Consolidated Subsidiaries

Regarding overseas consolidated subsidiaries, seven companies spread across China, Europe, North America, Southeast Asia and other regions completed establishment of EMS, either through acquisition of ISO 14001 registration or through self-declaration.

### Overseas Consolidated Subsidiaries

Oversight organization	Company	Location	Establishment level*	Date of establishment
Gas Turbine & Machinery Company	Kawasaki Gas Turbine Asia Sdn. Bhd.	Malaysia	3	Mar. 2013
	Wuhan Kawasaki Marine Machinery Co., Ltd.	China (PRC)	1	Jul. 2009
Plant & Infrastructure Company	KHI Design & Technical Service Inc.	Philippines	3	Nov. 2011
Motorcycle & Engine Company	Kawasaki Motors Corp., U.S.A.	U.S.A.	3	Mar. 2013
	Kawasaki Motors Pty. Ltd.	Australia	3	Mar. 2013
	P.T. Kawasaki Motor Indonesia	Indonesia	3	Jan. 2012
	KHITKAN Co., Ltd.	Thailand	1	Dec. 2011
	Kawasaki Motors (Phils.) Corporation	Philippines	3	Jan. 2012
	Kawasaki Motors Manufacturing Corp., U.S.A.	U.S.A.	1	Apr. 2003
	Kawasaki Motors Enterprise (Thailand) Co., Ltd.	Thailand	1	Dec. 2011
	Canadian Kawasaki Motors Inc.	Canada	3	Feb. 2013
Precision Machinery Company	Kawasaki Precision Machinery (Suzhou) Ltd.	China (PRC)	1	Dec. 2007
	Kawasaki Precision Machinery (UK) Ltd.	U.K.	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
Head Office	Kawasaki Robotics (U.S.A.) Inc.	U.S.A.	1	Feb. 2006
	KHI (Dalian) Computer Technology Co., Ltd.	China (PRC)	3	May 2013
Head Office	KCMA Corporation	U.S.A.	3	Mar. 2011

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

## Utilization of IT Systems

KHI utilizes IT systems to identify the direct and indirect environmental impact of its business operations and the state of progress with environmental management activities.

As environmental issues become increasingly complex, it is necessary to find solutions that transcend local and organizational structures. Because environmental management activities are an important element of business operations, speedy collation of accurate data and quantitative assessment forms part of our effort to fulfill Environmental Vision 2020.

Recent years have seen a steady increase in the environmental data items required: for example, reports to central and local government and responses to rating agency surveys, and the volume of data subject to analysis is therefore growing as well, requiring more efficient collection and analysis. Moreover, because of the electric power supply issues experienced in the wake of the Great East Japan Earthquake, management of energy data, especially data on electric power, has become ever more important.

### Environmental Data Management System

Currently, we are moving ahead with environmental management activities by rolling out to domestic consolidated subsidiaries our in-house Environmental Data Management System (ECOKEEP). In addition, we are working to introduce an energy visualization system that will include data on electric power demand for our factories.

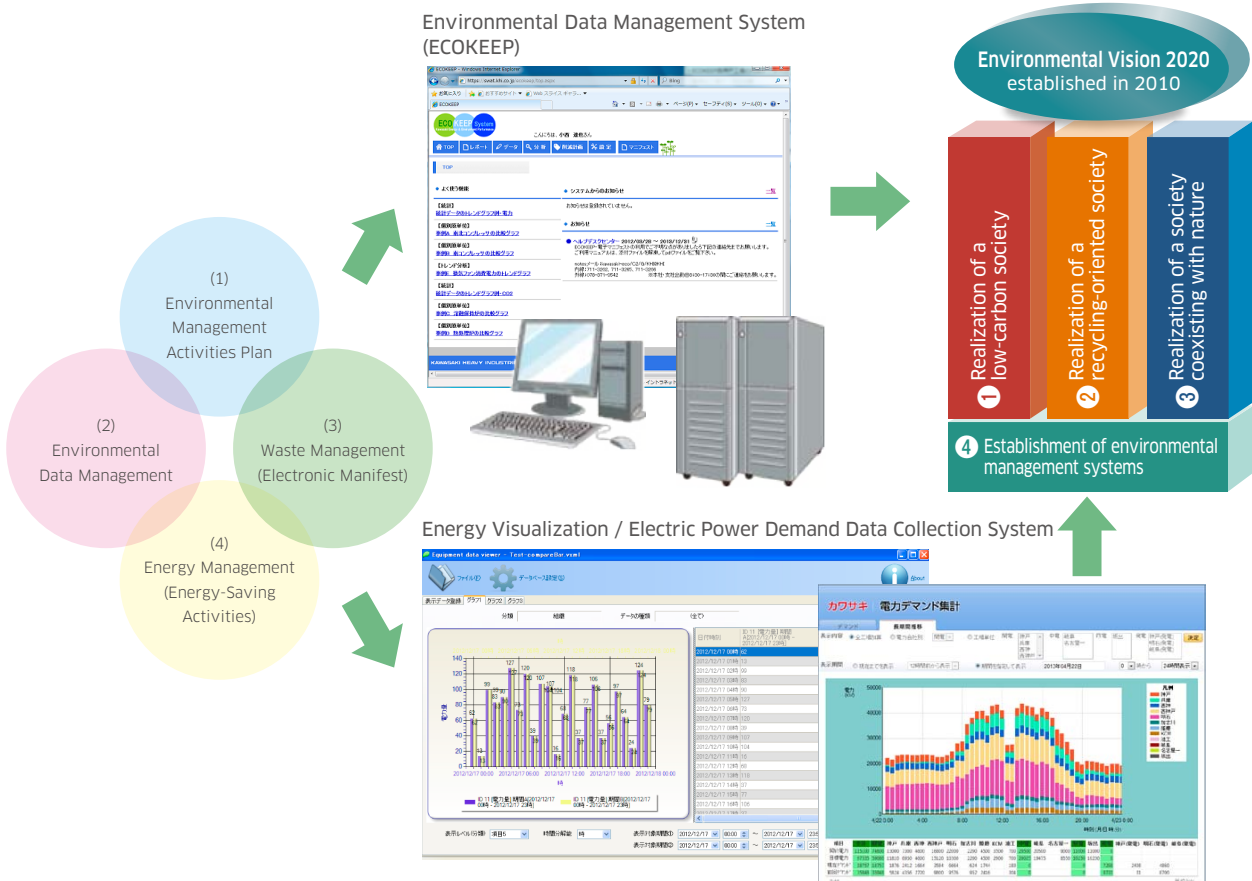
The constituent functions of ECOKEEP are management of target values for the Environmental Management Activities Plan, environmental data management, and waste management (electronic manifest). The system is

coordinated with an energy visualization system designed to facilitate energy-saving activities. The system can be utilized as follows.

- (1) Environmental Management Activities Plan: Each quarter, targets and measures for reduction of CO<sub>2</sub> emissions, energy consumption, waste generation and chemical substance utilization are monitored together with investment items for environmental conservation and their progress.
- (2) Environmental data management: In accordance with the KHI Group data collection manual, data for the month or another designated period is input and environmental performance is checked.
- (3) Waste management (electronic manifest): Through linkup to an electronic manifesto system as stipulated in Japan's Waste Disposal and Public Cleansing Law, the system monitors the industrial waste emissions of domestic factories and legal compliance.
- (4) Energy management: The system checks demand for purchase of electric power from electric power companies and achieves improvements by analyzing energy visualization data.

### Energy Visualization/Electric Power Demand Data Collection System

In fiscal 2013, we began operating a system for real-time data collection on the amount of electricity purchased and the amount generated in-house at nine factories, including the main affiliated companies in the Kansai region. We will extend this successively to our factories in other regions. In addition, we will expand the system's functions so that it can provide speedy and detailed information on utilization of energy forms other than electric power to promote a comprehensive approach to energy saving.



## Compliance with Laws and Regulations

### Legal Compliance Status in Japan

In fiscal 2013, there were no incidents of infringement by the KHI Group (judicial or administrative penalties, administrative measures, administrative warnings).

There were four instances of complaints from residents.

#### Violations and Accidents during the Past 5 Years

Fiscal year	2009	2010	2011	2012	2013
Judicial / administrative penalties	0	0	0	0	0
Administrative measures	1	0	0	0	0
Administrative warnings	4	0	2	2	0
Complaints from residents	4	0	5	0	4

\*Judicial / administrative penalties: Penalties handed down by judicial or administrative authorities

\*Administrative measures: Instructions for improvements and other corrective measures in written form

\*Administrative warnings: Verbal directives concerning business practices

### Legal Compliance Status Overseas

In fiscal 2013, as in fiscal 2012, we carried out a questionnaire survey of major overseas consolidated subsidiaries to check their compliance with environmental laws and regulations. Based on the results, we will promote adaptation to overseas legislation and reduction of environmental risk under the Eighth Plan.

## Risk Management

To ensure compliance with environmental laws and regulations as well as full familiarity with revisions to laws and improved ability among managers with environmental responsibilities, we hold liaison conferences at appropriate intervals to prevent accidents before they occur. The conferences are attended by environmental management officers from each business segment, who work together under the guidance of a secretariat (the Environmental Affairs Department).

In fiscal 2013, we held a liaison conference concentrating on the main points of the revision of the Water Pollution Prevention Law and a study meeting that covered processing activities, essential points of commissioned processing, and the promotion of appropriate processing (decomposition) of high-concentration and low-concentration PCB waste. Participants included the participation of managers from consolidated subsidiaries. From fiscal 2014, we will carry out on-site checks concentrating on overseas manufacturing bases to promote the reduction of environmental risk.

## Promoting Environmental Communication

### Raising Environmental Awareness

The KHI Group runs publicity campaigns designed to raise the environmental awareness of each and every employee. We undertake these campaigns continually to promote environmentally conscious conduct not only in the workplace but also in the community and at home.



"Eco Mind," featured in the Group magazine *Kawasaki*



Message from the President concerning environmental management

## Environmental e-Learning

To maintain and improve environmental awareness among employees throughout the domestic Group, we offer environmental e-learning opportunities to new employees. This ongoing process is aimed not only at new employees at KHI but also those at domestic consolidated subsidiaries. In fiscal 2013, approximately 1,150 people participated in the environmental e-learning courses. The attendance rate was 93%.

Employees for whom computer-based environmental e-learning is not convenient are offered lectures and other educational means, which have gathered approximately 7,200 participants during the five years since fiscal 2009.

## 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. In addition, as an internal qualification, we offer training for internal ISO 14001 auditors, through which 145 employees qualified as internal auditors in fiscal 2013.

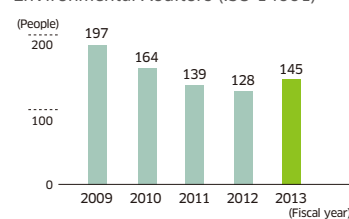
#### Number of Qualified Pollution Control Managers

Air	73
Water	76
Noise, vibration	42
Others	84
Total	275

#### Number of Qualified Energy Managers

Energy managers	51
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#### Number of Completed Training of Internal Environmental Auditors (ISO 14001)



## External Information Disclosure

At KHI, we are committed to information disclosure as indicated by our cooperation with numerous external evaluation organs, such as the CDP investors' information request "CDP Japan 500," published by the CDP (Carbon Disclosure Project), and the Nikkei Environmental Management Survey conducted by Nikkei Research, Inc.

## Ecocap Movement

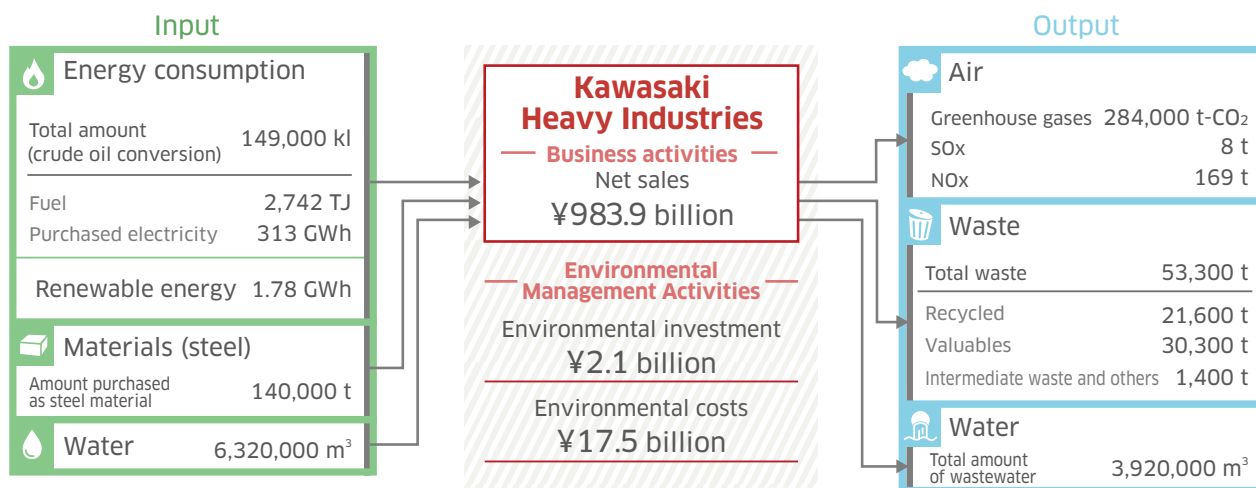
The KHI Group has participated since 2009 in the Ecocap Movement, which separates and collects plastic bottle caps and sells them to recycling firms. Profits from the sale go to provide polio vaccine to children around the world.

Since the start of our participation, the efforts of KHI Group employees have led to the collection of a cumulative total of some 990,000 caps, corresponding to polio vaccine for approximately 1,100 children.

We intend to continue with this activity as an environmental initiative to raise awareness of the efficient use of resources and the sorting and collection of waste.

### Material Balance of Business Activities for Fiscal 2013 (Overall Picture of the Environmental Impact)

KHI has drawn up a summary of the impact of our business activities on the environment during fiscal 2013. We undertake activities to reduce the amounts of raw materials, energy and water used in the manufacturing of our many products, and we strive to curb the emission of substances that adversely affect the environment.



### Environmental Accounting Calculations for Fiscal 2013

In compiling the statistics, reference was made to the Japanese Ministry of the Environment's Environmental Accounting Guidelines (2005 edition).

(Millions of yen)

Item		Environmental investments	Environmental costs	Economic effects	
Business area costs	Global warming prevention (Save energy, reduce greenhouse gas emissions, stop ozone layer destruction, etc.)	1,154	3,603	Energy-saving cost reduction 229	
	Efficient use of raw materials, water, and other resources	72	197	Resource-saving cost reduction 33	
	Resource-recycling activities	Resource-recycling activities	66	645	Income from recycling 610
		Waste disposal costs	0	406	Waste disposal cost reduction 4
	Environmental risk control	537	1,027	0	
	<b>Subtotal</b>	<b>1,829</b>	<b>5,878</b>	<b>876</b>	
Year-on-year comparisons		116%	99%	63%	
Upstream/downstream costs		123	2,739	0	
Management activity costs		1	369	0	
R&D costs		96	7,806	0	
Social activity costs		23	153	0	
Environmental remediation costs		0	583	0	
<b>Total</b>		<b>2,072</b>	<b>17,528</b>	<b>876</b>	
Year-on-year comparisons		119%	102%	63%	

Item	Total
Total investments	56,797
Total R&D costs	39,111

Item	Proportion
Percentage of investments (environmental investments 2,072 / Total investments 56,797)	4%
Percentage of R&D costs (environmental R&D costs 7,806 / Total R&D costs 39,111)	20%

## Realization of a Low-Carbon Society

### Reduction of Greenhouse Gas Emissions

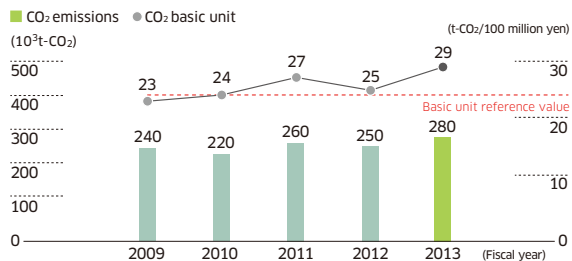
The KHI Group is committed to contributing to the prevention of global warming worldwide through products and manufacturing that use energy without waste. Under the Eighth Plan, action is directed toward targets set separately for reduction of the CO<sub>2</sub> emissions generated during production and reduction of CO<sub>2</sub> emissions through product-based contributions. The results for the Seventh Plan, which includes fiscal 2013, are presented below.

As a target for the first commitment period of the Kyoto Protocol, we committed to achieving a 10% reduction, compared with fiscal 2008, as a reference value in the average CO<sub>2</sub> emissions per unit of sales over the period from fiscal 2009 to fiscal 2013. The emissions figure per unit of sales for fiscal 2013 was 29 and the five-year average was 25, meaning that the target of 22 was not met. CO<sub>2</sub> credits will be used to cover the excess emissions.

In addition to Certified Emissions Reductions (CERs) under the United Nations Clean Development Mechanism (CDM)\*, we will also make use of a domestic credit of 2,580t-CO<sub>2</sub> acquired under a Hyogo Prefecture program aimed at reducing CO<sub>2</sub> emissions through joint reduction initiatives. The credit was obtained by replacing a heavy fuel oil-fired boiler made by Kawasaki Thermal Engineering Co., Ltd., with a newer and greener natural gas-fired boiler.

\* CDM: a system under which advanced countries and developing countries cooperate in projects to reduce greenhouse gases, with the investing developed nation receiving a CO<sub>2</sub> credit equivalent to the reduction achieved.

Changes in CO<sub>2</sub> Emissions and Basic Unit at KHI



- Notes:
- CO<sub>2</sub> emissions are impacted by the electricity emission factor.
  - CO<sub>2</sub> basic unit is a measurement obtained by dividing CO<sub>2</sub> emissions by net sales.
  - CO<sub>2</sub> emissions in logistics processes are calculated from our position as a specified consignor (a Japanese legal designation applied to consigners that ship 30 million ton-kilometers of freight or more per year), under the revised Energy Saving Law.

### Reduction of Energy Consumption

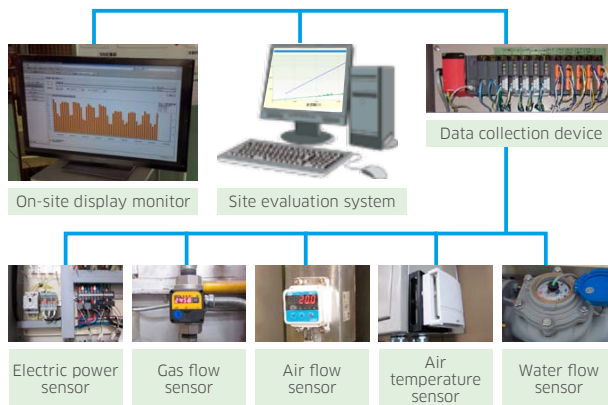
#### Reduction of Energy Consumption through Progress with Energy Visualization

By installing energy visualization facilities at the Kakogawa Works, we took measures to enhance energy saving.

The facilities installed at the Kakogawa Works measure not just electric power consumption but also the flow volumes of utility gas, compressed air and water, as well as the pressure of the compressed air and temperature.

In fiscal 2013, analysis of these data led to the identification of more than 50 items of waste, allowing a reduction in energy consumption.

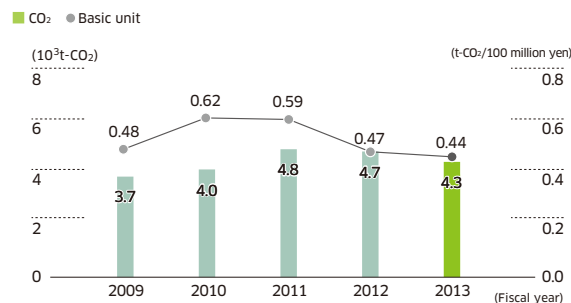
Structure of Energy Visualization Facilities



### Environmentally Conscious Logistics

KHI promotes energy-saving activities and data tracking to curb CO<sub>2</sub> emissions from logistics processes. Evaluating the Company's freight traffic on the basis of freight ton-kilometers carried (freight weight multiplied by distance), truck transport accounts for about half, with the balance of the freight carried by train or ship, which exerts less impact on the environment. In fiscal 2013, CO<sub>2</sub> emissions reached 4,300 t-CO<sub>2</sub> and CO<sub>2</sub> emissions per unit of sales totaled 0.44. We will continue to look at ways of boosting the load factor for truck transport and using modal shift from truck to other modes, such as train.

CO<sub>2</sub> Emissions from Logistics Processes



- Notes:
- CO<sub>2</sub> basic unit is a measurement obtained by dividing CO<sub>2</sub> emissions by net sales.
  - CO<sub>2</sub> emissions in logistics processes are calculated from our position as a specified consignor (a Japanese legal designation applied to consigners that ship 30 million tonkilometers of freight or more per year), under the revised Energy Saving Law.
  - CO<sub>2</sub> emissions from logistics processes in fiscal 2009 and 2010 do not include emissions by Kawasaki Shipbuilding Corporation and other subsidiaries before they merged into the Company on October 1, 2010.

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

Through the main products it delivered in fiscal 2013, KHI made an estimated yearly contribution to CO<sub>2</sub> emissions reduction of 500,000 t-CO<sub>2</sub>. See page 20 for information on the CO<sub>2</sub> emissions reduction benefit of our energy- and transport-related products, industrial machinery, and other products.

## Realization of a Recycling-Oriented Society

### Waste Reduction

#### Promote Resource Saving and the 3Rs

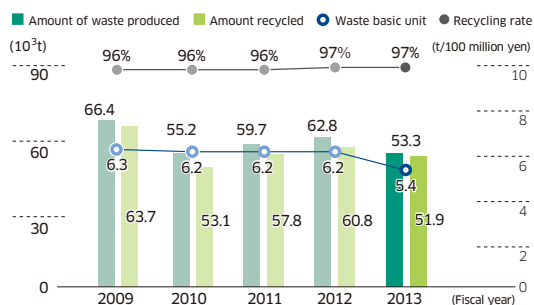
In its business operations and product development, KHI contributes to the realization of a recycling-oriented society by using the earth's limited resources while avoiding waste and by promoting reuse and recycling.

#### Zero Emission Activity and Improvement of the Recycling Rate

Based on social trends, KHI defines zero emissions as a final disposal ratio (landfill) of 1% or below. In fiscal 2013, we achieved zero emissions at our main factories.

Meanwhile, we fulfilled our fiscal 2013 total emissions target with a 23% reduction per unit of sales compared to the base year. We have achieved and maintained a high recycling rate of 97% for the overall Group, and will continue with action aimed at further improvement.

#### Waste Produced and Recycling Rate



### Appropriate Treatment of PCB Waste

In accordance with the Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes, KHI reports to the appropriate prefectural governor by June 30 each year any polychloride biphenyl (PCB) wastes located at its operating sites. Also, in accordance with the Waste Management and Public Cleansing Law and related Cabinet and ministerial ordinances, we appoint an industrial waste manager at each relevant business location and store waste with the utmost care in line with applicable storage standards.

#### High-Concentration PCB Waste

As part of operations to manage high-concentration PCB waste, 114 condensers were commissioned for treatment and disposal to the Japan Environmental Safety Corporation (JESCO) in fiscal 2012, and a further 98 in fiscal 2013. We will continue with appropriate treatment in the years ahead.

#### Low-Concentration PCB Waste

In the case of low-concentration PCB waste, we are preparing for the commissioning of treatment operations. The commission will need to be placed with a firm capable of appropriate and speedy handling, which we will carry out after calculating and securing the treatment budget and checking at first hand that the certified firms carry out appropriate treatment by verifying their certification and conducting observation at their treatment sites.



PCB discharge operations

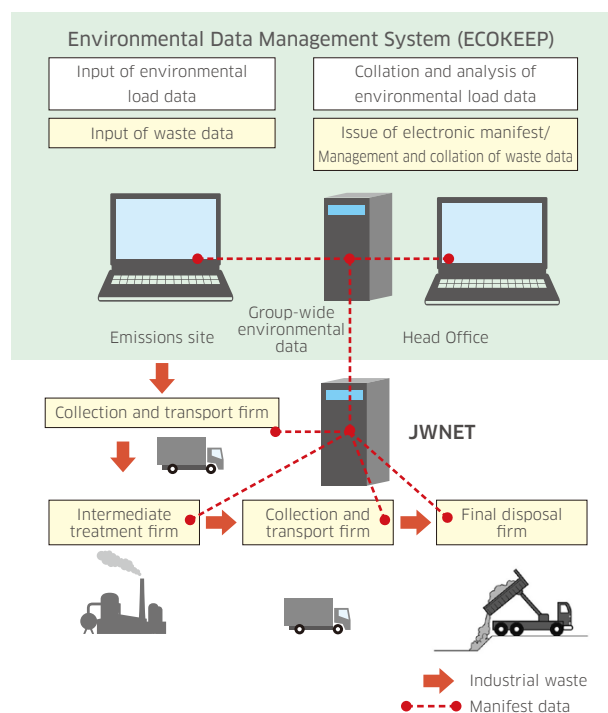


PCB storage warehouse

### Installing an Electronic Manifest System

In fiscal 2013, KHI introduced its in-house Energy/Environmental Data Management System (ECOKEEP), which is linked to the Japan Industrial Waste Information Center's electronic manifest system (JWNET). While performing integrated management of environmental data for all our factories, it contributes also to maintaining strict legal compliance and reducing the man-hours necessary to process manifest slips.

From fiscal 2014, the scope covered by the system will be expanded to encompass integrated management of environmental data for domestic consolidated subsidiaries.



## Realization of a Society Coexisting with Nature

### Chemical Substance Reduction

It is KHI's stated goal to contribute to reduced environment impact and conservation of the ecosystem through manufacturing that is in harmony with the global environment. KHI undertakes a range of activities to achieve this goal.

As part of its efforts to reduce chemical substances, KHI has set targets in every business segment for major VOCs (toluene, xylene and ethylbenzene), dichloromethane, and hazardous heavy metals, and each segment has embraced the necessary approaches. The status of the efforts to reduce major VOCs, dichloromethane, hexavalent chromium compounds and lead is outlined below. Suitable measures have been implemented in nearly all areas, but efforts will continue on the study and consideration of additional measures to curb the amount of chemicals subject to reduction.

For data on the release and transfer of chemical substances designated under the PRTR Law\*, please see Release and Transfer Volume of Chemical Substances (Fiscal 2013)(page 23).

\*PRTR Law: Pollutant Release and Transfer Register Law

#### Major VOCs

With regard to major VOCs, KHI promoted the switch to low-VOC paints, such as water-based paint, and improved coating efficiency through electrostatic coating, while reducing its use of cleaning solvents by installing solvent recovery equipment. We achieved a slight reduction in emissions from the fiscal 2012 level. In the future, however, we will strive to curb emissions through such measures as the wider application of alternative products, including water-based paints and high-solid paints.

#### Dichloromethane

Dichloromethane is often found in the paint strippers that KHI uses in its operations. Emissions were reduced compared to fiscal 2012. Going forward, KHI will strive to further reduce emissions, especially through replacement of paint strippers and enhancement of dichloromethane recovery methods.

#### Hexavalent Chromium Compounds

Hexavalent chromium is employed in special surface treatments, but we are working to introduce technology that makes it possible to avoid its use. The amount handled decreased over fiscal 2012, and we will continue with systematic efforts in the future by switching to chrome-free paint and other practical strategies.

#### Lead

Lead is often found in paint, so KHI's efforts have focused on switching to lead-free paint. KHI is working to reduce the use of lead, and the amount handled decreased from fiscal 2012. We will redouble our efforts to cut the usage of lead.

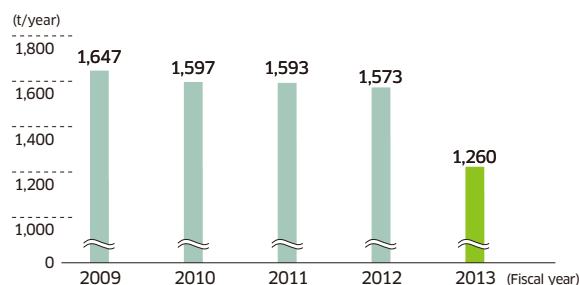
Under the Eighth Plan, which starts in fiscal 2014, we will continue to reduce controlled chemical substances.

Amounts of Chemicals Subject to Reduction Handled and Emitted (t/year)

Substance		Fiscal 2013	Increase or decrease from fiscal 2012
Major VOCs	Toluene	401	-9%
	Xylene	544	-20%
	Ethylbenzene	204	-26%
	<b>Total</b>	<b>1,149</b>	<b>-18%</b>
Dichloromethane		48	-18%
Hazardous heavy metals	Hexavalent chromium compounds	15	-37%
	Lead	1.2	-14%
	Cadmium	0.09	-32%

Note: Amounts of major VOCs and dichloromethane are the amounts emitted, while that of hazardous heavy metals is the amount handled.

Release and Transfer of Chemical Substances Designated under the PRTR Law



### Biodiversity-Friendly Society

A short-term target in Japan's national biodiversity strategy, which was revised in 2010, is to analyze the state of biodiversity to get a clearer picture of conditions and, based on this knowledge, to promote activities that protect biodiversity. We will support efforts to achieve this objective by implementing the activities listed below at all business sites with biodiversity protection in mind.

We also undertake activities such as greening programs on corporate premises that take into account location or other characteristics specific to each operating site.

#### Efforts to Reduce the Environmental Load from Business Activities

- (1) Promote measures to cut greenhouse gas emissions
- (2) Reduce the amount of industrial waste for final disposal
- (3) Decrease the environmental load from wastewater and chemical substances

#### Non-Business Activity

- (1) Promote cleanup events around business sites
- (2) Implement greening programs and other activities based on analysis of and insight into biodiversity conditions on corporate premises and the surrounding area
- (3) Embrace collaborative opportunities to protect biodiversity with local groups, such as creating corporate forests

## Contributing to the Environment through Our Products

### Main Efforts of the KHI Group

#### Product Assessment

For newly developed and designed products, as well as for particularly important products, KHI 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 during 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 the respective product. The main evaluation items of product assessment 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

#### 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 actions espoused by the Japan Automobile Manufacturers Association (JAMA). The Precision Machinery Company also applies this directive to some of our products. The RoHS Directive covers electric and electronic products, and some of the products made by the Precision Machinery Company and the Robot Division comply with this directive.

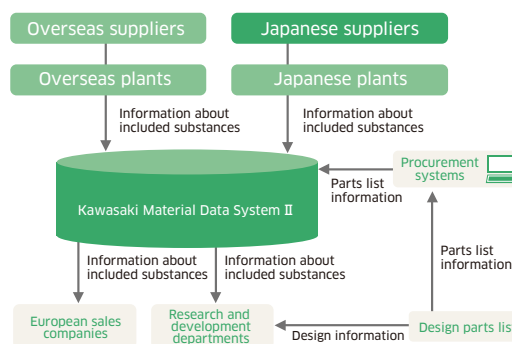
The REACH Regulation went into effect in June 2007 and applies to all chemical substances manufactured in and imported by the EU. Enterprises that manufacture or import one ton or more of chemical substances a year are required to register the chemical substances. As KHI products are

mainly molded articles, only a limited number need to be registered. 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 identify information about the chemical substances in products throughout our entire supply chain.

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

KHI practices CSR procurement (see "Kawasaki Report 2013 (Full Report)" page 46) 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 and respond to REACH and other chemical substance regulations.

#### Response to REACH 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, Authorisation and Restriction of Chemicals

\*4 Kawasaki Material Data System II: Currently we are preparing for the shift to International Material Data System (IMDS)

## Topic 1 Approach by the Motorcycle & Engine Company

### Cleaner Exhaust Gas

In fiscal 2013, we continued to tackle technologies that make exhaust from motorcycles cleaner, from a world standard perspective, and launched sales of the class-leading sports model Ninja 300. In the air intake system, the electronic fuel injection system equipped with dual throttle valves\*<sup>1</sup> and a fine-atomizing injector\*<sup>2</sup> achieves fine control of fuel supply in response to all driving conditions and attains high combustion efficiency, combining superior engine performance with cleaner exhaust emissions.



Ninja 300

\*1 Dual throttle valve: a device that achieves optimal control of air intake volume through coordination between an electronically operated throttle and a manually operated throttle.

\*2 Fine-atomizing injector: a device that achieves efficient combustion through fine atomization of fuel to a particle size of 60µm.



**Promoting the 3Rs**

Since October 2004, we have operated an independent motorcycle recycling system in cooperation with three other motorcycle manufacturers and 12 importers in Japan. In fiscal 2013, we achieved a recycling rate of 93.6%. Since October 2011, the user burden of recycling costs has become completely free of charge.

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 the voluntary targets of reduced 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 such as the JAMA voluntary reduction targets, but we are making elimination and reduction efforts that follow those applied to motorcycles, and we had achieved voluntary reduction targets for lead, mercury and cadmium by fiscal 2008. Hexavalent chromium had been contained to a very small amount, but we completed its elimination in fiscal 2009.

Source: Japan Automobile Manufacturers Association, Reduction Targets for Environmental Substances of Concern for New Vehicles

Substance	Reduction target
Lead*1	Use 60 g or less in and after January 2006 (for 210-kg weight vehicle)
Mercury	Use prohibited in and after October 2004 (Exception for the use of minute quantities in parts that are necessary for traffic safety*2)
Hexavalent chromium	Use prohibited in and after January 2008
Cadmium	Use prohibited in and after January 2007

\*1 Used batteries are already recycled and excluded from the target values  
 \*2 Combination lamps, discharge headlamps, etc.

**Topic 2 High-Efficiency Gas Turbine L30A Wins an Award in the Japan Industrial Technology Grand Prix**

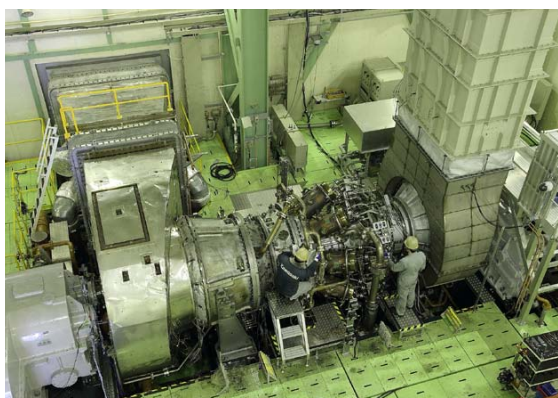
The L30A, a gas turbine in the 30 MW class developed by KHI, was recently awarded the special award by the Japan Industrial Technology Examination Committee in the 42nd Japan Industrial Technology Grand Prix, organized by the Nikkan Kogyo Shimbun. The Japan Industrial Technology Grand Prix focuses each year on technology development that has contributed to the growth of Japan's industrial society, recognizing the enterprises and groups that undertake development or practical applications.

The L30A has the world's highest level of efficiency in its class, a world-leading level of environmental performance and excellent maintenance characteristics. We believe that the prize award represents strong recognition of the technological capabilities that supported our in-house development of the L30A.

The L30A achieves a power generating efficiency of more than 40%, the world's highest level in its class. It also boasts outstanding environmental performance, with the world's lowest NOx emissions levels of 15 ppm or below (O<sub>2</sub> = 15%). The first model began pilot operation in October 2012 and accumulated over 4,600 operating hours by the end of March. After that, it has continued problem-free operation, clocking up a cumulative operating time of 700 hours a month on average. This facility has a cogeneration system using the L30A that can supply 30 MW of electric power and 46 tons of steam and is expected to deliver an annual energy-saving of 29% (equivalent to 24,000 kl

of crude oil), and an annual CO<sub>2</sub> reduction of 51% (117,000 t).

In recent years, cogeneration systems that use highly efficient and environment-friendly gas turbines and combined cycle plants have attracted attention as solutions to environmental and energy issues. Against this background, the L30A represents the optimal response to society's needs in this area. Receiving the prize award, we are committed to boosting our efforts to contribute to comfortable lifestyles for people around the world and the future of the global environment with distributing the L30A into a wide market in Japan and overseas.



L30A gas turbine of 30 MW class

## Environment-Conscious Products and Environmental-Solution Products

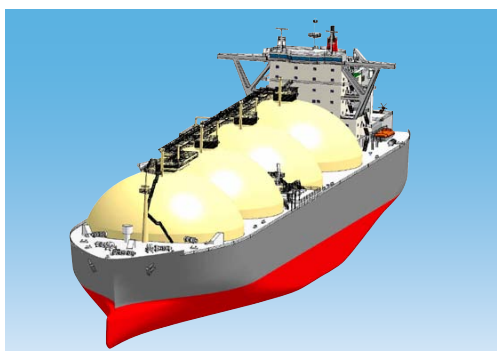
Among KHI's major business fields are transportation systems, energy and environmental engineering, and industrial equipment. Through these business fields, we deliver products endowed with high energy efficiency and environmental performance to the Japanese and overseas markets. In addition to environmentally conscious products that emphasize energy-saving, resource-saving, noise control, and similar issues, here we present examples of environmental-solution products, which are high-performance products related to various forms of energy supply, waste treatment, and prevention of environmental pollution.

### Order received for newly developed LNG carrier: an improvement of more than 25% in transport efficiency with vessels able to navigate the New Panama Canal

The LNG\* carrier for which the order was received is the largest-size Moss tank LNG\* carrier, which has a flexible range of applicability, can pass through the New Panama Canal (due for completion in 2015), and can also berth at the world's major LNG terminals.

The vessel has expanded its cargo tank capacity to approximately 164,700m<sup>3</sup>, while the main engine, an improved version of the energy-saving reheat steam turbine plant taken into service in 2011, offers an improvement in transport efficiency of 25% or more. The tank's thermal insulation performance has also been improved to achieve the world's lowest rate of boil-off (natural vaporization of LNG) at 0.08% per day. This means that gas generated naturally during marine navigation can be used with no wastage as fuel to provide propulsion power to the ship, making this a vessel with excellent levels of energy-saving and economy.

\*LNG: Liquefied natural gas



Newly developed LNG carrier

Energy saving

Fuel efficiency

### Launch of Series E6 Shinkansen rolling stock with a bold new color design

On March 16, 2013, the new Series E6 of high-speed rolling stock was launched on JR East's Tohoku and Akita Shinkansen (bullet train) lines. KHI was involved from the initial stage in the development project for this rolling stock, which is used mainly on Super Komachi services. In addition to the design and manufacture, KHI was placed in charge of the interior and exterior finish design, taking on the role of a design company for the first time. Like the earlier launched Series E5, the Series E6 model can operate at a maximum speed of 320 km/h. Its long-nosed front shaping reduces "micropressure waves," while the adoption of Inter-car fairings, sound-absorbing panels, a bogie shroud, and other features reduces noise and achieves additional improvements in environmental performance. Efforts were also devoted to realize lighter weight, which also contributes to improved energy-saving characteristics.



Shinkansen rolling stock Series E6

Energy saving

Environmental load reduction

### Railway battery power system delivered to Tokyo Monorail Co., Ltd.

The GIGACELL high-capacity nickel-metal hydride battery developed by KHI is capable of high-speed charging and discharging and swift control response, and is distinguished by its high electric power storage capacity. By developing a battery power system (BPS) for rail networks that make the most of GIGACELL's characteristics, KHI has contributed significantly to promoting energy saving and CO<sub>2</sub> reduction in the railway sector. By accumulating and storing the electric power generated when the train brakes, and recycling it, this energy storage system maximizes energy-saving benefit. In fiscal 2013, the system was delivered to Tokyo Monorail Co., Ltd., which, among other features, evaluated highly the system's ability to operate trains during power outages. Tokyo Monorail plans additional BPS installation in fiscal 2014, and the system is gradually building an operational track record.



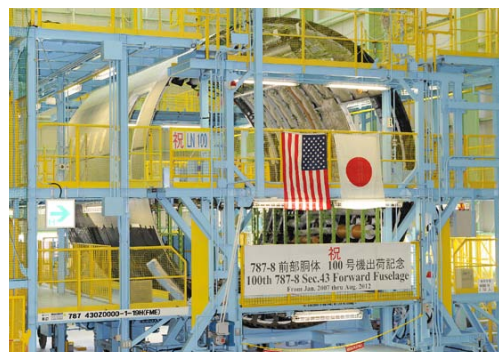
Railway battery power system

Energy saving

Environmental load reduction

### 100th forward fuselage delivered for the Boeing 787 Dreamliner

KHI is responsible for manufacturing the forward fuselage section of the 787 Dreamliner. In August 2012, we delivered to Boeing the milestone 100th unit. Extensive use of composite materials allows the 787 to achieve reduced weight. Combined synergistically with improvements to the engine and other modifications, this gives the aircraft its characteristic high level of fuel efficiency, with a reduction of approximately 20% in fuel costs compared to previous models. A contributory factor in this was our development of composite one-piece barrel molding technology for the forward fuselage. Although the forward fuselage manufacturing process uses large amounts of electric power, installing a large solar power generation panel on the factory roof has given access to renewable energy.



Forward fuselages for the Boeing 787

Fuel efficiency      Environmental load reduction

### KAWASAKI ECO SERVO used in hydraulic presses

In the hydraulic equipment and systems sector, in addition to promoting high levels of efficiency in equipment, we are promoting the use of system products characterized by compact dimensions and low noise levels along with driving energy-saving in control systems. These characteristics are being emphasized in the rollout to usage of KAWASAKI ECO SERVO in industrial equipment, including hydraulic presses and others. In combination with an electric motor for which it is possible to control rotation, the system allows optimal control of the hydraulic pump flow rate as well as reduction of the volume of hydraulic oil and more compact dimensions for peripheral devices. In hydraulic presses, these features contribute not only to energy-saving characteristics but also to preventing overheating of the hydraulic oil, boosting the reproducibility of press molding, and other performance improvements.



KAWASAKI ECO SERVO

Energy saving      Low noise

### BX series for spot welding achieves a major reduction in cycle time

The BX series is a vertically articulated robot that optimizes the spot welding of automobile bodies and components by employing the Z series of existing large, general-purpose robots. With their lightweight arms, small and high-output, high-revolution motors, and the latest in anti-vibration control technology, BX series robots achieve a cycle time about 25% shorter than equivalent models already on the market. In addition, creation of a hollow section in the arm to accommodate the cable harnesses of the welding gun realizes a compact body, reducing by approximately 50% the footprint compared to equivalent models already on the market and making it possible to install robots in high-density space.



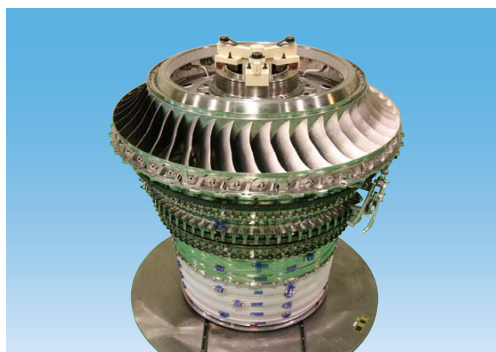
Spot-welding robots BX200L

Energy saving      Resource saving

### Trent 1000/XWB jet engines: realizing outstanding energy-saving and environmental performance

The Trent 1000 and Trent XWB are high bypass-ratio engines jointly designed and developed by KHI and Rolls Royce plc. for the new Boeing 787 and Airbus 350 aircraft models. The engines realized outstanding energy-saving performance (20-25% improvement in fuel economy compared to existing models of the same class, reducing fuel costs) and outstanding environmental performance (20-25% reduction in CO<sub>2</sub> emissions compared to existing models of the same class; low NOx and noise levels that meet and surpass regulation values set by the International Civil Aviation Organization).

We acquired engine-type certification for the Trent XWB in February 2013, while for the Trent 1000, already in operation, we aim to achieve improved performance through design changes. For the intermediate-pressure compressor (IPC) modules that form the core of these engines, we are responsible for operations from design and manufacture through to assembly, while for the Trent 1000 we also carry out engine testing.



Trent 1000 jet engine IPC module

Energy saving Environmental load reduction

### Japan's first 110MW gas engine power plant delivered

In August 2012, KHI delivered a 110MW gas engine power plant to Nihon Techno Co., LTD., a producer and supplier of power equipment. The 110 MW power plant constructed at Sodegaura, Chiba Prefecture, consists of 14 Kawasaki Green Gas Engines with an electrical output of 7,800 kW and the world's highest generating efficiency of 49.0%.

To ensure a stable power supply, there is increasing demand for distributed power systems including small and medium-scale utility and captive power plants. Kawasaki is constantly advancing to meet these needs with its innovative gas engines and other power systems.



Kawasaki Green Gas Engine

High efficiency Environmental load reduction

### Market launch of world's first compact centrifugal chiller using water as refrigerant

KHI has commercialized and begun sale of the world's first compact centrifugal chiller that uses water as refrigerant and is therefore CFC-free. The chiller is an environment-friendly model that uses water as refrigerant, thus contributing potentially to the protection of the ozone layer and the prevention of global warming. Water, a natural refrigerant, has the advantages of causing zero depletion of the ozone layer and containing no greenhouse gases or combustible or toxic substances.

The chiller has a cooling capacity of 100 US refrigerating tons (352 kW), suitable for the air-conditioning of a small commercial building, factory, or office. Despite being CFC-free, oil-free, and compact in design, it achieves a coefficient of performance (COP) of 5.1.\*



Compact centrifugal chiller using water as refrigerant

Environmental load reduction

\*COP (Coefficient of Performance): index of cooling efficiency calculated by dividing cooling output (kW) by electric power consumption (kW).

## Orders received from the city of Kobe for construction of waste-treatment facility and outsourced facility maintenance

KHI received an order from the City of Kobe for a project to build and maintain the city's 11th Clean Center jointly with Obayashi Corporation and Daiken Sekkei Inc. The incineration plant will feature parallel-flow stoker incinerators capable of high-performance combustion with a minimum air ratio as well as bag filters and a flue gas recirculation system to completely protect against atmospheric pollution. Meanwhile, the facility will also combine high-temperature, high-pressure boilers and extraction condensing turbines to realize a highly efficient electric power generation system capable of producing up to 15,200 kW. In addition, the entire facility will be designed to minimize the use of electric power to help reduce greenhouse gas emissions.



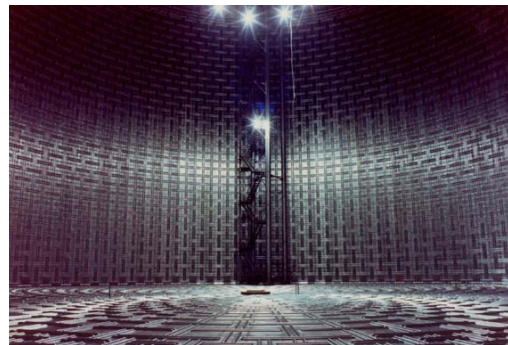
Projected appearance of the Kobe waste-treatment facility when completed

High efficiency Environmental load reduction

## Order received for in-ground LNG tank from Toho Gas Co., Ltd.

Liquefied natural gas (LNG), which consists mostly of methane cooled to a temperature of around -160°C, is a clean and environment-friendly energy source.

KHI has won an order from Toho Gas Co., Ltd., for one in-ground LNG storage tank for the company's Chita-Midorihamama Works. The tank will have a capacity of 220,000 kl and can hold an amount equivalent to the annual gas consumption of around 350,000 households. As well as the in-ground type, LNG tanks are made in a wide variety of other formats, including PC tanks, completely buried tanks, in-pit and single/double/full containment tanks. Able to handle all tank types, KHI has a track record of delivery covering more than 30 tanks in Japan and overseas. By constructing LNG tanks, KHI contributes to protecting the global environment.



LNG tank interior

Environmental load reduction

### CO<sub>2</sub> Emissions Reduction through Products for Major Products Delivered in Fiscal 2013

Field	CO <sub>2</sub> emissions reduction (t-CO <sub>2</sub> /year)	Major products	Technologies, remarks
Energy-related products	369,000	Gas turbine cogeneration system	①, ②
		Gas engine power generation system	①
		Binary turbine power generation system	③
		High-efficiency boiler system	②
		Absorption chiller / heater	②
Transportation-related products	123,000	Next-generation mid-sized "Boeing 787" (reduced weight)	④ Shared production
		LNG carriers, LPG carriers, bulk carriers (improved propulsion capabilities)	④
		Battery power system (BPS) for railways	③
		Vehicles fitted with fuel efficiency technology	④
Industrial equipment and other products	12,000	Sewage aeration blowers (Kawasaki MAG Turbo series)	⑤
		Natural gas compressed transport facilities (KC compressor)	⑤
		Electro-hydraulic hybrid system (KAWASAKI ECO SERVO)	⑤
		Large general-purpose robot	⑤
Total	504,000	-	-

#### Technologies:

1. High-efficiency power generation;
2. High-efficiency energy use;
3. Waste heat/exhaust energy use;
4. Reduced fuel costs;
5. Energy-saving equipment and other systems

#### CO<sub>2</sub> emissions reduction effect calculation reference points:

1. Emission factors for electricity, heat, fuel and other types of energy were set to comply with the manual for the Law Concerning the Promotion of Measures to Cope with Global Warming.
2. CO<sub>2</sub> emission reduction effect through improved efficiency is based on a comparison with products before replacement or with standard products on the market.
3. All energy derived from the use of waste energy and energy produced from waste products is counted toward the CO<sub>2</sub> reduction effect.

## Environmental Data

### Group-wide Environmental Load Data (Fiscal 2013)

		Unit	Whole group	Change from previous fiscal year	
Input	Total energy consumption (crude oil conversion)	kl	149,373	94%*	
	Purchased electricity	MWh	313,051	86%	
	Fuel	TJ	2,742	104%*	
	Renewable energy	MWh	1,782	101%	
	Materials	10,000 t	14	56%	
	Water	1,000 m <sup>3</sup>	6,315	102%	
Output	Air	CO <sub>2</sub> emissions volume from energy sources	t-CO <sub>2</sub>	284,067	113%
		SO <sub>x</sub>	t	8	67%
		NO <sub>x</sub>	t	169	71%
		Soot and dust	t	2	50%
		PRTR regulated substance	t	1,055	77%
	Water	Wastewater	1,000 m <sup>3</sup>	3,915	100%
		COD	t	10	100%
		Nitrogen	t	29	145%
		Phosphorus	t	0.1	25%
		PRTR regulated substance	t	1	50%
	Waste	Total emitted	t	53,285	85%
		Recycled	t	51,946	85%
		Intermediate waste	t	1,173	71%
		Final disposal volume	t	166	56%
		Specially controlled industrial waste in above total	t	1,868	112%
		PRTR regulated substance in above total	t	228	83%
	Others	CO <sub>2</sub> emissions during transport	t-CO <sub>2</sub>	4,290	91%

\*Change from previous fiscal year is calculated based on FY2012 figures not including energy sold (same basis as for fiscal 2013 figures).

## Waste and Other Emissions Volume and Recycling Volume (Fiscal 2013)

(t)

Type of waste	Total emissions volume	Recycling (material recycling)	Recycling (thermal recycling)	Recycling rate	Intermediate treatment	Final disposal
<b>General waste</b>						
Paper scrap	1,480	832	648	100	0	0
Wood scrap	348	296	52	100	0	0
Others	426	412	14	100	0	0
<b>Subtotal</b>	<b>2,254</b>	<b>1,540</b>	<b>714</b>	<b>100</b>	<b>0</b>	<b>0</b>
<b>Industrial waste</b>						
Cinders	1	1	0	100	0	0
Sludge	2,121	1,522	413	94	88	97
Waste oil	5,987	2,158	3,829	100	0	0
Waste acid	194	147	47	100	0	0
Waste alkali	436	376	61	100	0	0
Waste plastics	3,075	1,087	903	95	1,085	0
Wood scrap	3,331	1,727	1,604	100	0	0
Fiber scrap	302	40	262	100	0	0
Metal scrap	846	846	0	100	0	0
Glass, concrete debris and ceramics	134	131	0	93	0	3
Slag	2,337	2,139	136	98	0	62
Rubble (waste construction materials)	42	41	0	87	0	1
Soot and dust	1	0	0	0	0	1
Others	37	37	0	100	0	0
<b>Subtotal</b>	<b>18,844</b>	<b>10,253</b>	<b>7,254</b>	<b>93</b>	<b>1,173</b>	<b>164</b>
<b>Specially controlled industrial waste</b>						
Waste oil	669	543	126	100	0	0
Waste acid	845	825	19	89	0	1
Waste alkali	304	288	16	86	0	0
Infectious waste	0.4	0.1	0	13	0	0.3
Hazardous industrial waste	48	44	4	100	0	0
Waste asbestos, etc.	1	0	0	0	0	1
<b>Subtotal</b>	<b>1,867</b>	<b>1,701</b>	<b>165</b>	<b>99</b>	<b>0</b>	<b>2</b>
Valuables (metal scrap, etc.)	30,320					
<b>Total</b>	<b>53,285</b>	<b>43,813</b>	<b>8,133</b>	<b>97</b>	<b>1,173</b>	<b>166</b>

## Release and Transfer Volume of Chemical Substances (Fiscal 2013)

(t)

Government ordinance no.	Name of substance	Volume released				Volume transferred	
		Air	Water	Soil	Subtotal	Sewer	Waste
Class I designated chemical substances: annual volume handled 1t or above							
053	Ethylbenzene	189	0	0	189	0	15
080	Xylene	468	0	0	468	0	76
086	Cresol	0	0.02	0	0.02	0	1
087	Chromium and chromium (III) compounds	Under 0.01	0.08	0	0.08	0	3
144	Inorganic cyanide compounds	0	Under 0.01	0	Under 0.01	0	2
186	Dichloromethane	44	Under 0.01	0	44	0	4
238	Hydrogenated terphenyl	2	0	0	2	0	1
240	Styrene	9	0	0	9	0	0.2
296	1,2,4-trimethylbenzene	6	0	0	6	0	0.2
297	1,3,5-trimethylbenzene	4	0	0	4	0	0.4
300	Toluene	315	0	0	315	0	86
349	Phenol	0	Under 0.01	0	Under 0.01	0	4
374	Hydrogen fluoride and its water-soluble salts	0.1	0	0	0.1	0	10
412	Manganese and its compounds	1	0	0	1	0	14
Special Class I designated chemical substances: annual volume handled 0.5t or above							
088	Chromium (VI) compounds	Under 0.01	Under 0.01	0	Under 0.01	0	4
243	Dioxins	0.02	Under 0.01	0	0.02	0	0
309	Nickel compounds	0	0.5	0	0.5	0	2

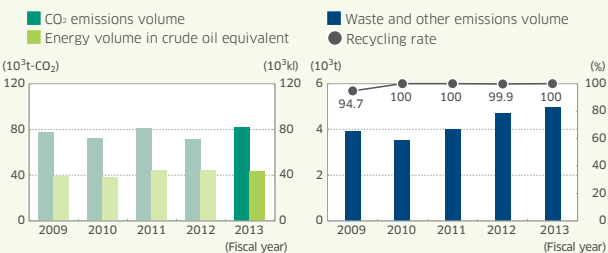


## Environmental Load Data by Business Site (Fiscal 2013) 1/2

		Unit	Gifu Works	Nagoya Works 1	Kobe Works	Hyogo Works	Nishi-Kobe Works	
Input	Total energy consumption (crude oil conversion)	kl	33,181	8,736	11,970	6,109	16,232	
	Purchased electricity	MWh	59,733	33,340	31,690	18,807	58,838	
	Fuel	TJ	708	15	156	52	57	
	Renewable energy	MWh	0	962	34	29	574	
	Water	1,000 m <sup>3</sup>	4,125	42	357	122	151	
Output	Air	CO <sub>2</sub> emissions volume from energy sources	t-CO <sub>2</sub>	65,043	16,637	21,790	10,618	27,281
		SOx	t	1	Under 0.1	7	0	0
		NOx	t	44	1	108	0.6	0.7
		Soot and dust	t	0.6	Under 0.1	1	0.1	Under 0.1
		PRTR regulated substance	t	138	5	143	103	55
	Water	Wastewater	1,000 m <sup>3</sup>	2,436	7	116	122	151
		COD	t	7	0.2	Under 0.1	Under 0.1	0.4
		Nitrogen	t	17	Under 0.1	Under 0.1	Under 0.1	0.8
		Phosphorus	t	Under 0.1	Under 0.1	Under 0.1	Under 0.1	Under 0.1
		PRTR regulated substance	t	Under 0.1	0	0	0	0
	Waste	Total emitted	t	4,522	437	9,619	4,310	5,322
		Recycled	t	4,522	437	9,570	4,310	5,322
		Intermediate waste	t	0	0	0	0	0
		Final disposal volume	t	0	0	49	0	0
		Specially controlled industrial waste in above total	t	336	9	173	131	40
		PRTR regulated substance in above total	t	53	1	45	43	32

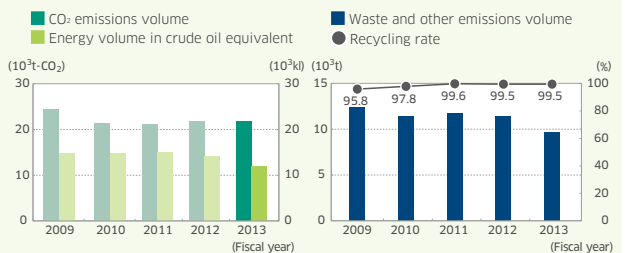
### Gifu Works (Including Nagoya Works 1)

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



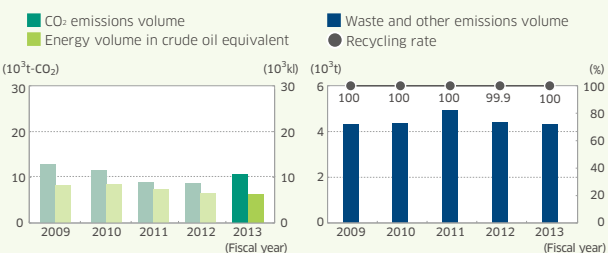
### Kobe Works

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



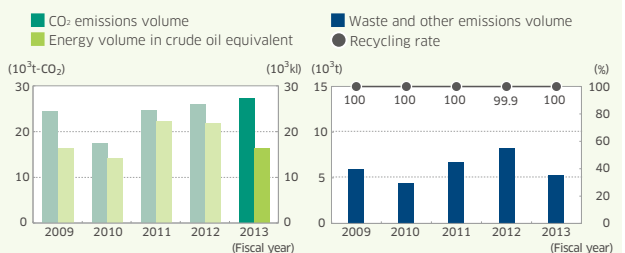
### Hyogo Works

**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



Note: CO<sub>2</sub> emissions are impacted by the electricity emission factor.

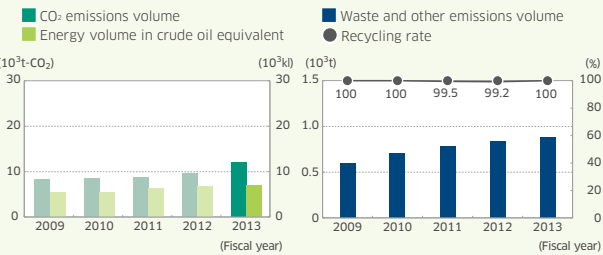
## Environmental Load Data by Business Site (Fiscal 2013) 2/2

		Unit	Seishin Works	Akashi Works	Kakogawa Works	Harima Works	Sakaide Works	
Input	Total energy consumption (crude oil conversion)	kl	6,961	47,478	3,694	4,048	9,142	
	Purchased electricity	MWh	21,424	30,563	6,950	13,049	32,763	
	Fuel	TJ	62	1,543	76	28	36	
	Renewable energy	MWh	0	115	0	5	63	
	Water	1,000 m <sup>3</sup>	82	975	12	84	362	
Output	Air	CO <sub>2</sub> emissions volume from energy sources	t-CO <sub>2</sub>	12,024	95,630	6,734	6,972	17,979
		SOx	t	0	0	0	0	0
		NOx	t	1	13	0	0.2	0.1
		Soot and dust	t	Under 0.1	Under 0.1	0	Under 0.1	0.3
		PRTR regulated substance	t	10	113	0	41	446
	Water	Wastewater	1,000 m <sup>3</sup>	82	658	5	23	313
		COD	t	0.2	2	Under 0.1	Under 0.1	0.3
		Nitrogen	t	0.5	10	Under 0.1	Under 0.1	0.3
		Phosphorus	t	Under 0.1	0.1	Under 0.1	Under 0.1	Under 0.1
		PRTR regulated substance	t	0	1	0	0	0
	Waste	Total emitted	t	875	8,404	1,840	4,959	12,712
		Recycled	t	875	8,400	1,826	4,959	11,440
		Intermediate waste	t	0	0	0	0	1,173
		Final disposal volume	t	0	4	13	0	99
		Specially controlled industrial waste in above total	t	89	1,047	0	0	43
		PRTR regulated substance in above total	t	3	33	0	3	16

### Seishin Works

**Location** 8-1, Takatsukadai 2-chome, Nishi-ku, Kobe, Hyogo 651-2271, Japan

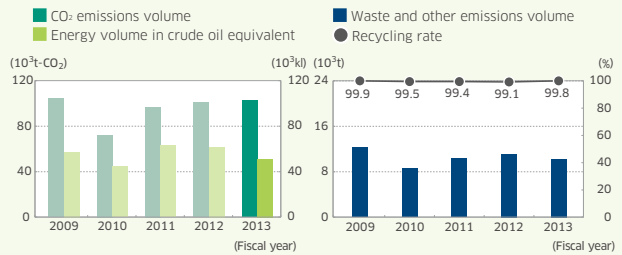
**Main products** Component parts for jet engines and gas turbines



### Akashi Works (including Kakogawa Works)

**Location** 1-1, Kawasaki-cho, Akashi, Hyogo 673-8666, Japan

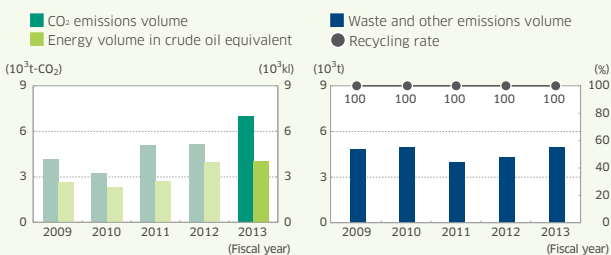
**Main products** Motorcycles, General-purpose gasoline engines, industrial robots, jet engines, industrial gas turbines



### Harima Works

**Location** 8, Nijijima, Harima-cho, Kako-gun, Hyogo 675-0155, Japan

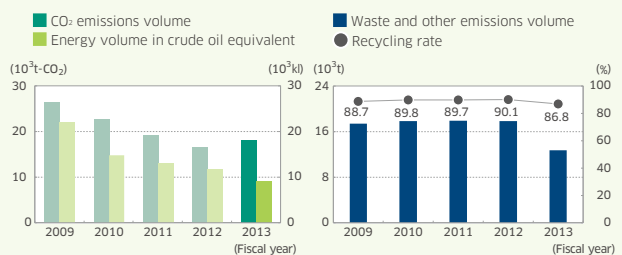
**Main products** Industrial & environmental plants, boilers, construction machinery, rolling stock



### Sakaide Works

**Location** 1, Kawasaki-cho, Sakaide, Kagawa 762-8507, Japan

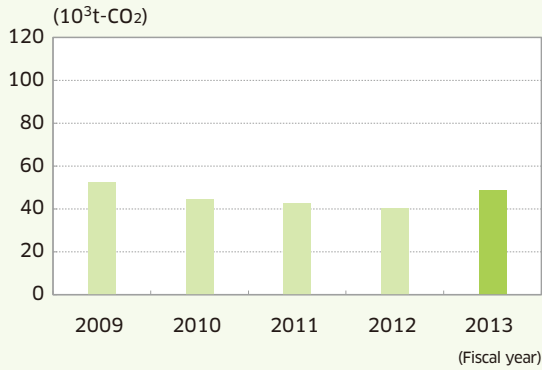
**Main products** Ships & maritime application equipment (LNG carriers, LPG carriers, container ships, etc.)



Note: CO<sub>2</sub> emissions are impacted by the electricity emission factor.

## CO<sub>2</sub> Emissions Volume of Consolidated Subsidiaries (Fiscal 2013)

### Domestic Subsidiaries

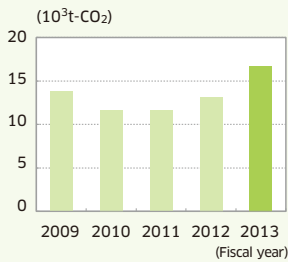


### Overseas Subsidiaries

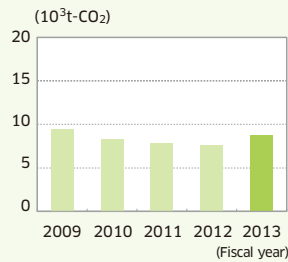


### Domestic Main Subsidiaries

#### NIPPI Corporation

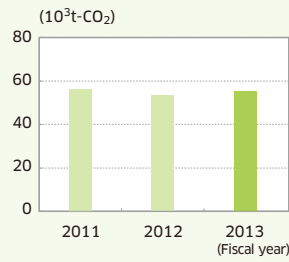


#### EarthTechnica Co., Ltd.

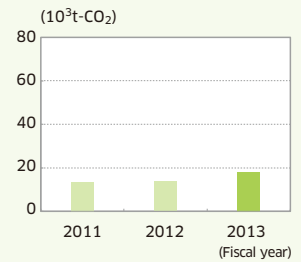


### Overseas Main Subsidiaries

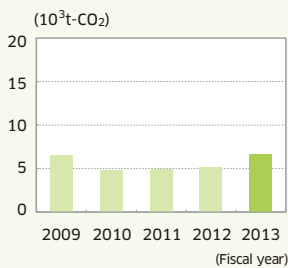
#### Kawasaki Motors Manufacturing Corp., U.S.A.



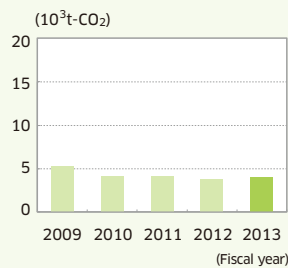
#### Kawasaki Motors Enterprise (Thailand) Co., Ltd.



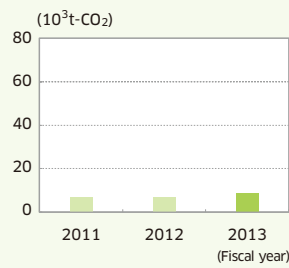
#### KCM Corporation



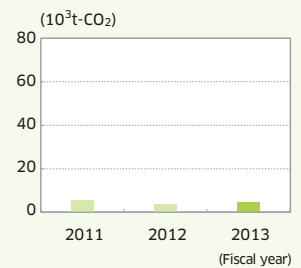
#### Technica Corp.



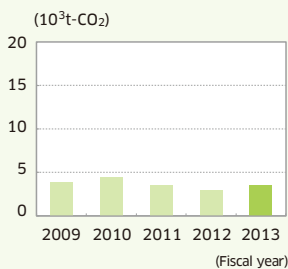
#### KHITKAN Co., Ltd.



#### P.T. Kawasaki Motors Indonesia



#### Kawasaki Thermal Engineering Co., Ltd.



Note: the CO<sub>2</sub> emissions coefficients used in graphs are in principle those indicated below.

- Japanese Ministry of the Environment website: press releases: publication of emissions coefficients for each fiscal year (<http://www.env.go.jp/press/press.php?serial=14702>)
- For CO<sub>2</sub> emissions volume through overseas electricity consumption, the figures published by the Greenhouse Gas Protocol are used.