

## KHI Group CSR Report 2011

# Detailed Environmental Report



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# Promoting Environment Management

## Establishment of Environmental Vision 2020

In fiscal 2011, we drafted Environmental Vision 2020, which seeks to define what the Group should be in 2020 from an environmental perspective under our Group Mission: “Kawasaki, working as one for the good of the planet (Enriching lifestyles and helping safeguard the environment: Global Kawasaki).” Realization of this vision will be supported by environmental management activities plans, which run for three years. We embarked on the 7th Environmental Management Activities Plan in fiscal 2011, at the same time that Environmental Vision 2020 was launched, with targets to achieve during this three-year period and key strategies to implement in each year of the plan.

Based on the environmental philosophy described in our Environmental Charter, Environmental Vision 2020 will underpin the establishment of three types of societies—a low-carbon society, a sound material-cycle society, and a society that coexists with nature. A fourth component—the establishment of environmental management systems—forms the cornerstone of such societies. Through our Environmental Vision 2020, we aim to contribute to integrating business management and environmental management activities and contribute to a sustainable society.

Flow of Environmental Management



## Environmental Charter (Established in 1999, rev. 2010)

### Environmental Philosophy

The KHI Group has undertaken business with the advancement of society and the nation through “manufacturing” as our foundation, and has sought to develop a global enterprise in “key industries related to land, sea, and air.” In doing so, we have worked toward resolution of global environmental problems by seeking the “realization of a low-carbon society,” the “realization of a sound material-cycle society,” and the “realization of a society coexisting with nature.” We will contribute to “the sustainable development of society” through business activities that are in harmony with the environment and through the KHI Group’s own products and services that show consideration for the global environment.

### Conduct Guidelines

1. Recognizing that global environmental protection is a common and serious issue for humankind, KHI Group will positively volunteer to engage itself in harmonizing with the environment globally. We shall regard this as one of the most important strategies when we deploy our business activities.
2. During its production stages, KHI Group will endeavor to conserve resources, to save energy, to recycle resources and to reduce industrial waste and will promote the reduction of environmental impact.
3. In the new product planning (i.e. research and development) and designing stages, KHI Group will render careful attention throughout the procurement, production, distribution, utilization and material disposal stages in order to minimize the environment impact.
4. KHI Group will minimize the impact of its business activities on ecosystems and proactively protect those ecosystems.
5. In seeking solutions to global environmental issues, KHI Group will do its best to develop and provide new technologies and new products that contribute to environmental protection, energy saving and resource conservation.
6. Not only complying with environmentally related institutional laws, regulations and agreements and voluntary action plans of each industry concerned, but KHI Group will voluntarily institute its own environmental control standards as an appropriate and necessary action in order to strive to improve environmental control levels.
7. Through environmental training and public awareness activities, KHI Group will strive to enlighten all its employees on global environmental issues and will support individual views, lifestyles and will encourage their participation in the social activities and services.
8. KHI Group will implement an environmental management system to promote environmental preservation and conservation, and hold regular conferences to review management systems and maintain continual improvement.



## Environmental Vision 2020

- Realization of a low-carbon society
- Realization of a sound material-cycle society
- Realization of a society coexisting with nature
- Establishment of environmental management systems

### Three Points of Entry onto the Path Toward Realization of a Sustainable Society

#### Realization of a low-carbon society

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

##### Perspective on our activities

In many areas of the world, global warming appears to be driving wide-scale climate change. To address problems like these that affect our planet's sustainability, KHI Group is working to reduce the greenhouse gas emissions associated with our business activities and providing products and services that help reduce those same emissions, thereby contributing to building a low-carbon society.

##### Ideal in 2020

- 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 planetary scale.
- 3 Promote energy conservation in production and logistics processes and reduce emissions of greenhouse gases.

#### Realization of a sound material-cycle society

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

##### Perspective of our activities

Planetary resources to support human life are now being consumed faster than the earth can naturally replace them. KHI Group endeavors to conduct business and develop products in order to fully use, reuse and recycle limited resources and thereby help achieve a sound material-cycle society.

##### Ideal 2020

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

#### Realization of a society coexisting with nature

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

##### Perspective of our activities

Biological diversity sustains the ecosystems that make up our global environment. Biodiversity provides us with food and natural resources, regulates our climate, cycles materials and cleans the environment. We will conduct business activities that lessen our burden on the environment and we will help prevent pollution and protect ecosystems through our products and technologies.

##### Ideal 2020

- 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.

### Building a foundation for environmental management

#### Establishment of environmental management systems

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

##### Perspective of our activities

We aim to achieve a sustainable society and to contribute to more prosperous lifestyles for the people of the world and a brighter future for the global environment through environmentally conscious business activities and products and services.

##### Ideal 2020

- 1 Have an environmental management system (EMS) in place at every consolidated subsidiary in Japan and abroad and practice environmental management throughout the Group.
- 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.

# Promoting Environment Management

## 7th Environmental Management Activities Plan Results of Fiscal 2011 and Priority Initiatives for Fiscal 2012

The 7th Environmental Management Activities Plan, which inaugurated the Environmental Vision 2020, runs from fiscal 2011 through fiscal 2013. This plan sets out four themes—the realization of a low-carbon society, the realization of a sound material-cycle society, and the realization of a society coexisting with nature, as well as the establishment of environmental management systems to serve as a foundation for environmental management—that will enable us to realize our vision.

### 7th Environmental Management Activities Plan (Fiscal 2011–Fiscal 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

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

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

**Realization of a sound material-cycle society** Engage in manufacturing that uses resources without waste in order to recycle and fully utilize limited resources

#### (1) Activities to reduce total waste emissions

- ① Promote resource savings and 3R (reduce, reuse, recycle)
- 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 plan for PCB wastes and follow through with appropriate measures

**Realization of a society coexisting with nature** Contribute to reduced 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 controlled chemical substances reduction target for fiscal 2011 through fiscal 2013, compared with average for fiscal 2004 through fiscal 2006

#### (2) Environmental contributions through products and technologies

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

#### (3) Reduce impact on and conserve biodiversity

- Decide on biodiversity action guidelines and promote conservation

**Establishment of environmental management systems** Build a foundation for environmental management that will realize the Environmental Vision 2020

#### (1) Build EMS for KHI Group

**Group target:** Finish building EMS at consolidated subsidiaries in Japan and abroad that are key production bases by fiscal 2013.

#### (2) Thoroughly comply with environmental laws and regulations

- Prevent recurrence of environmental accidents, etc.

#### (3) Practice environmental communication

- Promote environmental dialog with all stakeholders

Main initiatives of 7th Environmental Management Activities Plan

● **Realization of a low-carbon society**

We are aiming to achieve our company-wide Fiscal 2013 objective for greenhouse gases, which is to reduce the average basic unit of emissions (meaning CO<sub>2</sub> emissions/sales) for Fiscal 2009-2013 by 10% compared with the level of Fiscal 2008. This objective represents a specific initiative to counter global warming.

● **Realization of a sound material-cycle society**

Our measures to reduce total waste emissions include promoting conservation and the 3R movement.

● **Realization of a society coexisting with nature**

We have engaged in measures to reduce chemical substances, environmental contributions through our products and technology, and the like.

● **Establishment of environmental management systems**

We have committed ourselves to promoting the establishment of EMS in all consolidated subsidiaries in Japan and overseas.

Also, we have committed ourselves to environmental risk management and employee education.

Evaluation: ◎ Achieved ○ Greater than 70% achieved △ Less than 70% achieved

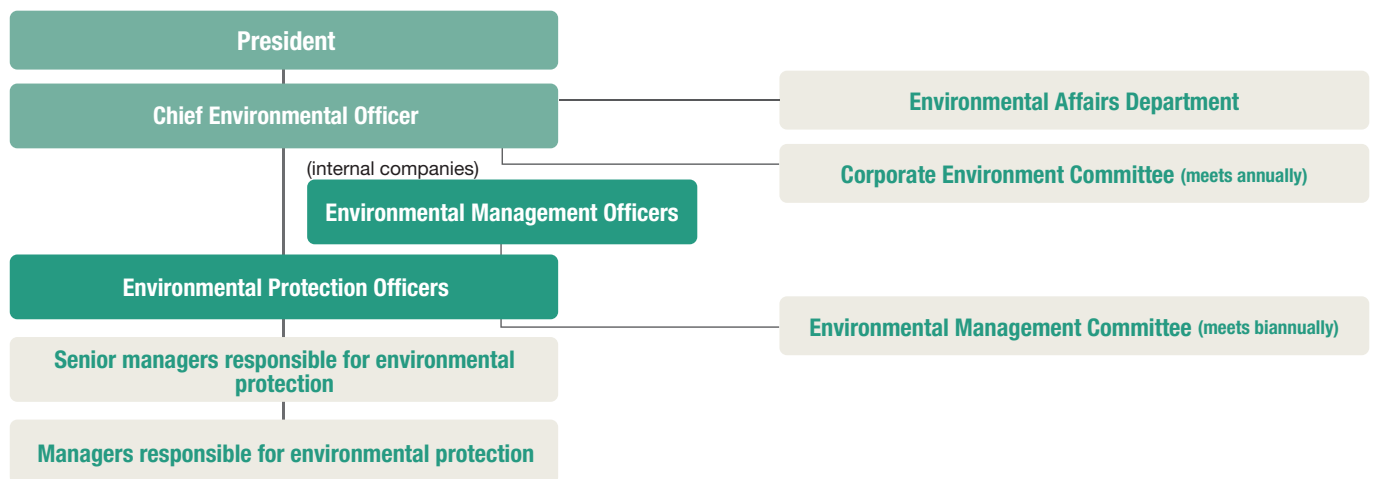
Results of Fiscal 2011	Evaluation	Priority Initiative for Fiscal 2012
<p><b>1. Global warming prevention measures</b></p> <p>A) Reduce CO<sub>2</sub> emissions from our own production activities</p> <ul style="list-style-type: none"> <li>● Make CO<sub>2</sub> emissions tangible and verifiable (includes response to Revised Energy-Saving Law)</li> <li>● Take Group-wide CO<sub>2</sub> reduction measures (energy-saving capital investment)</li> <li>● Strengthen voluntary reduction initiatives of each department and follow through on plans</li> </ul> <p>B) Acquire emissions credits with KHI Group products and technologies</p> <ul style="list-style-type: none"> <li>● Give indirect support for activities of each department for reducing CO<sub>2</sub> with UN CDM program, etc.</li> <li>● Participate in CO<sub>2</sub> reducing project in Japan.</li> </ul> <p>C) Purchase emissions credits from trading market</p> <ul style="list-style-type: none"> <li>● Examine burden of purchasing portion of reduction targets not achieved</li> </ul> <p>D) Acquire emissions credits by endowment or donation</p> <ul style="list-style-type: none"> <li>● Study forest conservation activities and use of green electric power, etc.</li> </ul>	○	<p><b>1. Global warming prevention measures</b></p> <p>A) Reduce CO<sub>2</sub> emissions from our own production activities</p> <ul style="list-style-type: none"> <li>● Introduce system to make CO<sub>2</sub> emissions tangible (includes response to Revised Energy-Saving Law); operate system at pilot plant and collect and distribute energy-saving know-how in-house; operate corporate data system and promote tangible system at factories</li> <li>● Undertake Groupwide CO<sub>2</sub> reduction measures (energy-saving capital investment)</li> <li>● Implement energy-saving capital investment (factory and office lighting, energy-saving inverters) and verify the results of such energy-saving measures</li> <li>● Strengthen energy-saving activities in each segment and follow through on plans</li> <li>● Establish corporate energy-saving promotion structure</li> </ul> <p>B) Acquire emissions credits with KHI Group products and technologies</p> <ul style="list-style-type: none"> <li>● Consider responses to new measures that fight global warming</li> </ul> <p>C) Purchase emissions credits from trading market</p> <ul style="list-style-type: none"> <li>● Examine burden of purchasing portion of reduction targets not achieved</li> </ul> <p>D) Acquire emissions credits by endowment or donation</p> <ul style="list-style-type: none"> <li>● Forest conservation activities, use of green electric power, etc.</li> </ul>
<p><b>1. Activities to reduce total waste emissions</b></p> <ol style="list-style-type: none"> <li>1) Activities to reduce three substances with greatest waste emissions (metal scrap, waste oil, wood scrap)</li> <li>2) Promote resource savings and 3R</li> <li>3) Maintain and enhance zero emissions status</li> <li>4) Promote implementation of electronic manifests</li> </ol>	○	<p><b>1. Activities to reduce total waste emissions</b></p> <ol style="list-style-type: none"> <li>1) Activities to reduce three substances with greatest waste emissions (metal scrap, waste oil, wood scrap)</li> <li>2) Promote resource saving, 3R</li> <li>3) Maintain and enhance zero emissions status</li> <li>4) Promote implementation of electronic manifests</li> <li>5) Establish and operate waste management system (incorporated into electronic manifests)</li> </ol>
<p><b>2. Decide on proper treatment plan for PCB wastes and follow through with appropriate measures</b></p> <ol style="list-style-type: none"> <li>1) Follow through on JESCO commissioned processing</li> <li>2) Follow through on processing trends and number of processed units of equipment containing low-density PCBs</li> </ol>	○	<p><b>2. Decide on proper treatment plan for PCB wastes and follow through with appropriate measures</b></p> <ol style="list-style-type: none"> <li>1) Follow through on JESCO commissioned processing</li> <li>2) Follow through on processing trends and number of processed units of equipment containing low-density PCBs</li> </ol>
<p><b>1. Activities to reduce chemical substances</b></p> <ol style="list-style-type: none"> <li>1) Perform critical point follow-through in departments stepping up reduction measures in seventh plan <ul style="list-style-type: none"> <li>● Acknowledge and organize usage status, clarify issues and set targets</li> </ul> </li> </ol>	△	<p><b>1. Activities to reduce chemical substances</b></p> <ol style="list-style-type: none"> <li>1) Perform critical point follow-through in departments stepping up reduction measures in 7th Plan <ul style="list-style-type: none"> <li>● Acknowledge and organize usage status, clarify issues and set targets</li> <li>● Promote implementation and follow through with low-VOC paints as well as heavy-metal-free painting and surface-processing technologies</li> </ul> </li> </ol>
<p><b>2. Environmental contributions through products and technologies</b></p> <ol style="list-style-type: none"> <li>1) Activities to reduce environmental impacts over product life cycle <ul style="list-style-type: none"> <li>● Select model products and examine evaluation techniques</li> <li>● Report environmental contributions from products and technologies</li> </ul> </li> <li>2) Make products greener <ul style="list-style-type: none"> <li>● Respond thoroughly to laws and regulations (RoHS Directive, REACH Regulations, etc.)</li> <li>● Promote green procurement (set a green purchasing rate and take measures to achieve it)</li> </ul> </li> </ol>	△	<p><b>2. Environmental contributions through products and technologies</b></p> <ol style="list-style-type: none"> <li>1) Activities to reduce environmental impact over product life cycle <ul style="list-style-type: none"> <li>● Assess CO<sub>2</sub> reduction effects on products related to energy and transportation</li> <li>● Consider evaluation techniques for life cycle assessment</li> <li>● Report environmental contributions from products and technologies</li> </ul> </li> <li>2) Make products greener <ul style="list-style-type: none"> <li>● Respond thoroughly to laws and regulations (RoHS Directive, REACH Regulations, etc.)</li> <li>● Set standards for green products and boost sales of such products</li> </ul> </li> </ol>
<p><b>3. Activities to protect biodiversity</b></p> <ol style="list-style-type: none"> <li>1) Promote initiatives within works</li> </ol>	△	<p><b>3. Activities to protect biodiversity</b></p> <ol style="list-style-type: none"> <li>1) Set corporate policy on initiatives and follow through with appropriate measures</li> </ol>
<p><b>1. Build an EMS at KHI Group</b></p> <ol style="list-style-type: none"> <li>1) Devise and promote plan for building EMS at consolidated subsidiaries in Japan and abroad</li> <li>2) Collect major environmental data for entire Group (energy, waste, chemical substances, etc.)</li> </ol>	○	<p><b>1. Build EMS for KHI Group</b></p> <ol style="list-style-type: none"> <li>1) Devise and promote a plan for building EMS at consolidated subsidiaries in Japan and abroad <ul style="list-style-type: none"> <li>● In fiscal 2012, introduce EMS at five domestic subsidiaries and five overseas subsidiaries</li> </ul> </li> <li>2) Collect major environmental data for entire Group (energy, waste, chemical substances, etc.) <ul style="list-style-type: none"> <li>● Collect information from Group companies on energy/CO<sub>2</sub> emissions and disclose data to public</li> <li>● In fiscal 2012, collect environmental data from 46 domestic subsidiaries and 24 overseas subsidiaries</li> </ul> </li> </ol>
<p><b>2. Thoroughly comply with environmental laws and regulations</b></p> <ol style="list-style-type: none"> <li>1) Activities of Environmental Law and Regulation Compliance Status Review Committee</li> <li>2) Follow up on environmental law revisions, etc., and implement throughout the Group</li> </ol>	◎	<p><b>2. Thoroughly comply with environmental laws and regulations</b></p> <ol style="list-style-type: none"> <li>1) Activities of Environmental Law and Regulation Compliance Status Review Committee</li> <li>2) Follow up on environmental law revisions, etc., and implement throughout the Group</li> </ol>
<p><b>3. Practice environmental communication</b></p> <ol style="list-style-type: none"> <li>1) Awareness-raising activities for KHI Group employees (environmental education)</li> <li>2) Disclose environmental data within and beyond Group (issue environmental news, CSR report, etc.)</li> <li>3) Company forest restoration program</li> </ol>	◎	<p><b>3. Practice environmental communication</b></p> <ol style="list-style-type: none"> <li>1) Awareness-raising activities for KHI Group employees (environmental education)</li> <li>2) Disclose environmental data within and beyond Group (issue environmental news, CSR Report, etc.)</li> <li>3) Company forest restoration program</li> </ol>

# Building an Environmental Management Platform

## Environmental Management Organization

The director for environmental issues at KHI is appointed Chief Environmental Officer and in this position chairs the Corporate Environment Committee, which deliberates and decides on operations of a variety of important matters related to the environment. To enable each internal company to independently promote the environmental management activities plan as designed, environmental management

officers, environmental protection officers, senior managers responsible for environmental protection, and managers 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 a coordinated effort among all employees to implement environment-oriented initiatives.



## EMS Administration

All KHI production bases have acquired ISO 14001 certification. Currently, we are working to expand the scope of Environmental Management System (EMS) implementation at subsidiaries in Japan and abroad and continue activities aimed at establishing environmental management structures, including compliance with environmental laws and regulations.

Of the 46 domestic subsidiaries that we targeted for EMS adoption, 41 had completed development of the necessary structure by the end of fiscal 2011. The remaining five subsidiaries are expected to finish their preparations in fiscal 2012.

To date, we focused on principal factories, but under the 7th Environmental Management Activities Plan, we will strive to expand the scope of EMS establishment at overseas locations. Of the 24 subsidiaries that have been targeted for an EMS, KCMA Corporation, in the United States, completed implementation in fiscal 2011. Of the 17 companies that still have not configured the appropriate EMS, we will in accordance with local laws and regulations clarify objectives based on business conditions and scale of operations, and set time frames and otherwise implement incremental efforts to expedite EMS implementation.

## Current Situations for Acquiring ISO 14001 (JIS Q 14001) Certification

### Kawasaki Heavy Industries

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

LRQA: Lloyd's Register Quality Assurance, JICQA: JIC Quality Assurance, NK: Nippon Kaiji Kyokai (ClassNK), BSK: Bouei Choutatsu Kiban Seibi Kyoukai (Defense Procurement Framework Establishment Association of Japan), DNV: Det Norske Veritas

### Subsidiaries Overseas

Oversight organization	Company	Date Acquired	Registration
Machinery Division	Wuhan Kawasaki Marine Machinery Co., Ltd.	Jul. 2009	DNV
	Kawasaki Motors Manufacturing Corp. Lincoln Plant (U.S.A.)	Apr. 2003	DNV
Motorcycle & Engine Company	Kawasaki Motors Manufacturing Corp. Maryville Plant (U.S.A.)	Feb. 2006	DNV
	Kawasaki Precision Machinery (UK) Ltd. (U.K.)	Nov. 2001	LRQA
Precision Machinery Company	Flutek, Ltd. (South Korea)	Nov. 2005	KMA
	Kawasaki Precision Machinery (Suzhou) Ltd. (China)	Dec. 2007	BSI
Robot Division	Kawasaki Robotics, Inc. (U.S.A.)	Aug. 2003	DNV
Head Office	KCMA Corporation (U.S.A.)	Mar. 2011	(Self Declaration)

DNV: Det Norske Veritas, LRQA: Lloyd's Register Quality Assurance, KMA: KMA R&A Inc., BSI: British Standards Institution

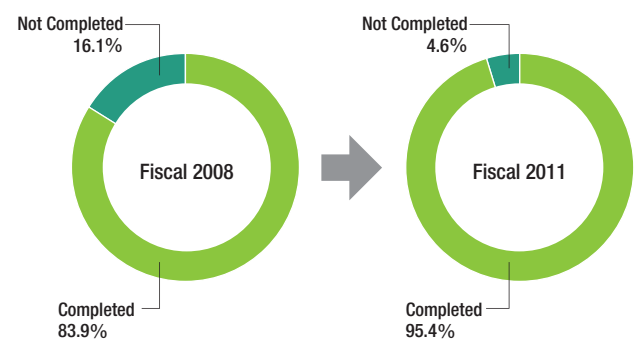
Subsidiaries in Japan

Oversight organization	Company	Establishment level	Date of Establishment
Head office	Kawaju Tokyo Service Corp.	3	Mar. 2009
	Kawasaki Trading Co., Ltd.	1	Dec. 2004
	Kawaju Service Co., Ltd.	1	Feb. 2000
	Kawaju Techno Service Corp.	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
	Kawasaki Machine Systems, Ltd.	1	Mar. 2000
Ship & Offshore Structure	KCM Corporation	1	May. 2000
	Akashi Ship Model Basin Co., Ltd	3	Mar. 2008
	Kawasaki Techno Wave Co., Ltd.	1	Aug. 2000
	Kawaju Kobe Support Co., Ltd.	2	Dec. 2005
	Kawaju Marine Engineering Co., Ltd.	1	Mar. 2008
Rolling Stock	KHI JPS Co., Ltd.	3	Mar. 2008
	Kawasaki Shipbuilding Inspection Co., Ltd.	2	Apr. 2008
	Alna Yusoki-Yohin Co., Ltd.	1	Nov. 2008
	EarthTechnica M&S Co., Ltd.	1	Sep. 2000
	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
Aerospace	EarthTechnica Co., Ltd.	1	Sep. 2000
	Nichijo Manufacturing Co., Ltd.	3	Oct. 2005
	Fukae Powtec Co., Ltd.	3	Mar. 2010
	Kawaju Gifu Engineering Co., Ltd.	1	Feb. 2002
Gas Turbine	Kawaju Gifu Service Co., Ltd.	1	Feb. 2002
	KGM (Kawaju Gifu Manufacturing) Co., Ltd.	1	Feb. 2002
	NIPPI Corporation	1	Dec. 2006
Gas Turbine	Kawaju Akashi Engineering Co., Ltd.	1	Mar. 2000
	Kawasaki Thermal Engineering Co., Ltd.	1	Apr. 2002

- level 1 Acquire ISO14001 certification
- level 2 Acquire simplified EMS certification
- level 3 Self-declaration of EMS establishment

Oversight organization	Company	Establishment level	Date of Establishment
Machinery	Kawasaki Prime Mover Engineering Co., Ltd.	1	Dec. 2002
	Kawasaki Naval Engine Service, Ltd.	1	Dec. 2002
Plant & Infrastructure	Kawasaki Engineering Co., Ltd.	3	Oct. 2009
	KEE Environmental Construction, Co. Ltd.	1	Dec. 2003
	KEE Environmental Service, Ltd.	1	Jun. 2002
	Kawaju Steel Work & Engineering Co., Ltd.	3	Jun. 2006
Motorcycle & Engine	Kawaju Facilitch Co., Ltd.	2	Jul. 2007
	K-GES Co., Ltd.	1	Jan. 2006
	Kawasaki Motors Corporation Japan	1	Feb. 2008
	K-TEC Corporation	3	Dec. 2009
	Union Precision Die Co., Ltd.	1	Jul. 2006

Proportion of Employees of Subsidiaries in Establishing EMS Structures



Compliance with Laws & Regulations

In fiscal 2011, there were no judicial or administrative penalties and no administrative measures at any KHI facilities, but there were two administrative warnings and five citizen complaints. The administrative warnings stem from issues regarding higher-than-allowable pH value in wastewater from the Harima Works and the reported value of water quality at the Akashi Works. Corrective action was immediately taken.

Status Law and Regulation Compliance and Environmental Protection Activities Overseas

Overseas subsidiaries and offices of the Group are expected to abide by environmental laws and regulations just as domestic operations do, and we seek to expand the scope of EMS implementation and eliminate factors that lead to environmental accidents.

To enhance environmental management and lower environmental risk throughout the Group, regardless of location, we have broadened the range of environmental impact data we collect from principal subsidiaries overseas. In addition to data on energy usage, collected since fiscal 2011, we now accumulate data on the volume of waste and chemical substances discharged and handled. Also, we will establish a format in fiscal 2012 to confirm environmental management status through local surveys of key overseas subsidiaries by the Environmental Affairs Department and promote efforts to minimize risk.

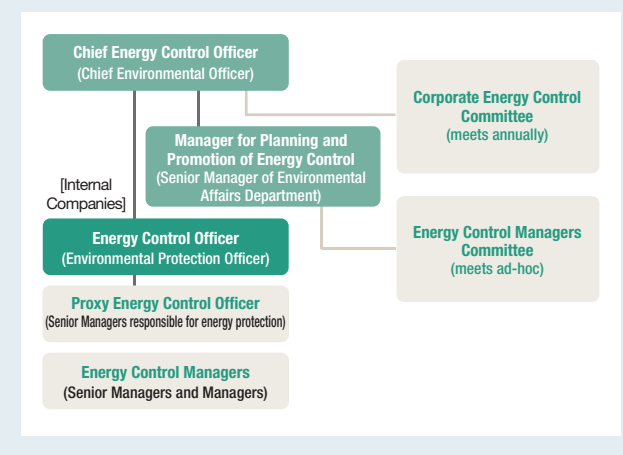
Violations and Accidents during the Past 5 Years

Fiscal Year	2007	2008	2009	2010	2011
Judicial/Administrative Penalties	0	0	0	0	0
Administrative Measures	0	0	1	0	0
Administrative Warnings	6	4	3	0	2
Complaints from residents	1	2	4	0	5

Topics

Introducing Energy Control System for Entire Company

We reinforced energy control system for KHI Group considering the revision of Energy Conservation Law and importance of energy saving activity.



# Building an Environmental Management Platform

## Risk Management

Prompted by an environmental violation at the Akashi Works in February 2009, we set up an Environmental Law and Regulation Compliance Status Review Committee, which did on-site studies on compliance with environmental laws and regulations at the works of KHI Group. In fiscal 2011, the Committee did on-site studies at 5 works of

4 principal subsidiaries in Japan, and Gifu Works and Akashi Works of KHI which have major impact on environment. The Committee confirmed the status of compliance with environmental laws and regulations at these works. Such a preventive measure helps us ensure compliance with laws and regulations.

## Environmental Awareness Activities for Employees

### Environmental e-Learning/Courses for People without Computers

To sustain a high level of environmental awareness among employees throughout the Group, we offer environmental e-learning for newly hired individuals. This ongoing process is aimed not only at new employees at KHI but also those at subsidiaries. In July and August 2011, approximately 500 people participated in environmental e-learning classes, for a 90% attendance rate. For employees who find it difficult to participate in the e-learning classes because they lack easy access to a personal computer, we offer lecture-style classes. In the three years since these classes were first offered, in fiscal 2009, we have had around 5,700 people attend lectures, for an attendance rate of 73%.

### Environmental Awareness

We run publicity campaigns designed to raise the environmental awareness of each and every employee. We undertake these campaigns all the time to promote environmentally conscious conduct not only in the workplace but also in the community and at home.

### 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.



Message from the President concerning environmental management

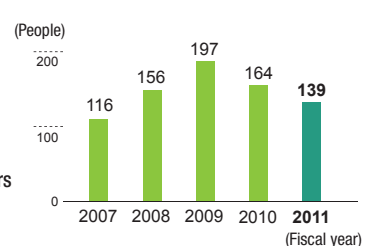
Environmental News, published four times a year

"Eco Mind," featured in the Group magazine Kawasaki

### Number of Qualified Pollution Control Managers

Air	70
Water	75
Noise, Vibration	43
Others	21
Total	209

### Number of Newly Registered ISO 14001 Internal Environmental Auditors



### Number of Qualified Energy Managers

Energy Managers	46
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## Environmental Accounting Calculations for Fiscal 2011

Item		Environmental Investments	Environmental Costs	Economic Effects	
Business area costs	Global warming prevention Save energy, reduce greenhouse gas emissions, stop ozone layer destruction, etc.	1,103	1,701	Energy-saving cost reduction 480	
	Efficient use of raw materials, water, and other resources	6	252	Resource-saving cost reduction 50	
	Resource-recycling activities	Resource-recycling activities	60	800	Income from recycling 686
		Waste disposal costs	0	168	Waste disposal cost reduction 2
	Environmental risk control	230	1,830	—	
	Subtotal	1,400	4,750	1,218	
Year-on-year comparisons		92%	128%	90%	
Upstream/downstream costs		139	2,776	126	
Management activity costs		20	462	—	
R&D costs		502	7,449	—	
Social activity costs		56	195	—	
Environmental remediation costs		41	80	—	
Total		2,158	15,712	1,343	
Year-on-year comparisons		120%	104%	100%	

Item	Total
Total investments in fiscal 2011	71,684
Total R&D costs in fiscal 2011	35,321

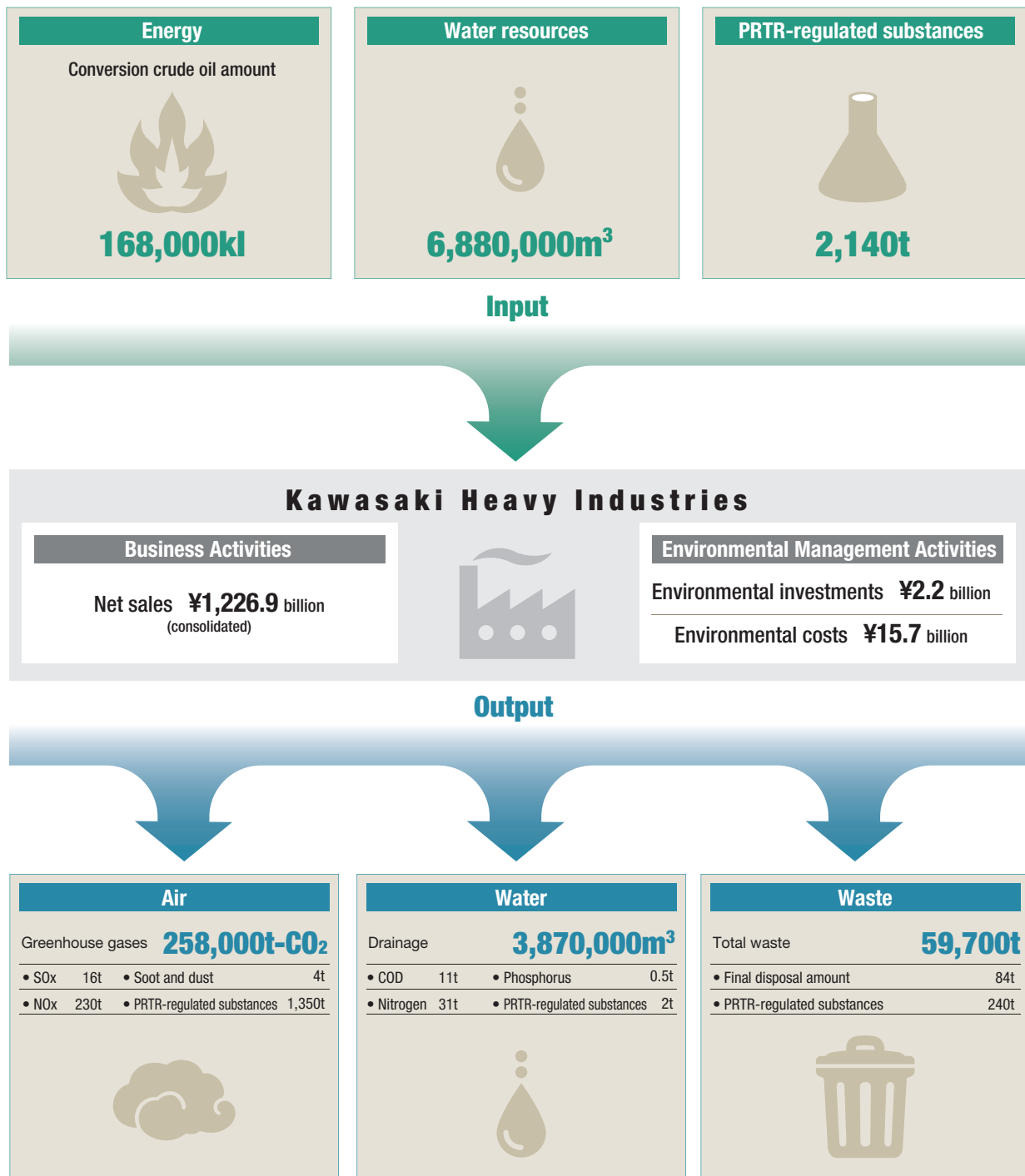
Item	Proportion
Percentage of investments (Environmental investments 2,158/Total investments 71,684)	3%
Percentage of R&D costs (Environmental R&D costs 7,449/Total R&D costs 35,321)	21%

- Data was compiled in accordance with the Environmental Accounting Guidelines released by the Ministry of the Environment.
- Coverage: Kawasaki Heavy Industries, Ltd.
- Period: April 1, 2010 to March 31, 2011



## Material Balance of Business Activities for Fiscal 2011 (Overall Picture of Environmental Impact)

We have put together a summary of the impact of our business activities on the environment during fiscal 2011. We undertake activities to reduce the amounts of raw materials, energy, and water used in the production of the many products we make and strive to curb emission of substances that adversely affect the environment.



# Realization of a low-carbon society

## Reducing Greenhouse Gas Emissions

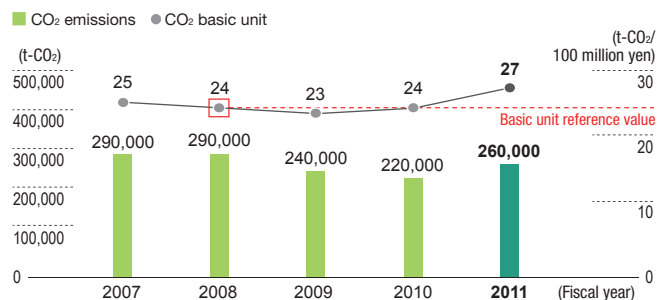
It is our stated goal to contribute to the prevention of global warming through products and manufacturing that use energy without waste, and we undertake activities to reduce greenhouse gas emissions generated in our manufacturing processes.

Our greenhouse gas reduction target is to achieve an average 10% decrease between fiscal 2009 and fiscal 2013 in our CO<sub>2</sub> basic unit, compared with the fiscal 2008 reference value. The results for fiscal 2011, a turning point, showed a basic unit of 27t-CO<sub>2</sub>/¥100 million—against the benchmark 24t-CO<sub>2</sub>/¥100 million—indicating that it will be difficult to reach our target. It must be noted, however, that CO<sub>2</sub> emissions hovered around 260,000t-CO<sub>2</sub> in fiscal 2011, a significant year-on-year increase paralleling a recovery in capacity utilization at our facilities.

We also emphasize activities geared toward saving energy in manufacturing and will reinforce efforts to invest in energy-saving equipment, such as photovoltaic power generation equipment and high-efficiency lighting systems, at our factories.

- \*1 CO<sub>2</sub> basic unit is a measurement obtained by dividing CO<sub>2</sub> emissions by net sales.
- \*2 CO<sub>2</sub> emissions data is consistent with published data by business (specified emitters), based on the system for calculation, reporting and public disclosure of greenhouse gas emissions under the Law Concerning the Promotion of Measures to Cope with Global Warming.
- \*3 CO<sub>2</sub> emissions are for KHI and include emissions by Kawasaki Shipbuilding Corporation, Kawasaki Precision Machinery Ltd. (KPM), and Kawasaki Plant Systems, Ltd. (K Plant) before merging into the Company on October 1, 2010.
- \*4 The parameters for net sales, used in the calculation of the basic unit, are the same as those applied to emissions in \*3 above.

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



## Topics

As a participating company in a partnership program established by Hyogo Prefecture to reduce CO<sub>2</sub> emissions, KHI earned domestic carbon offsetting credits on products made by companies under the KHI Group umbrella. This program takes advantage of Japan's carbon credit system. Specifically, we entered into a joint CO<sub>2</sub> reduction project to replace a heavy oil-fired boiler made by Kawasaki Thermal Engineering with a greener city gas-fired boiler, also made by this subsidiary. The project was recognized by the Certification Committee, established by the Japanese government, and the associated carbon credits were put into KHI's account as of fiscal 2011. The boiler replacement is expected to cut CO<sub>2</sub> emissions by about 2,600 tons by the end of March 2013.

Note: Hyogo Prefecture's CO<sub>2</sub> reduction partnership program is a strategy that utilizes the national carbon credit system to award credits to companies that support initiatives to prevent global warming within the prefecture.

## Cutting Energy Consumption

Seeking to achieve greater energy efficiency in our production activities, we promote basic unit management activities companywide. In this context, the basic unit is not the net sales-indexed measurement used to evaluate overall greenhouse gas reduction efforts but rather a control indicator for setting benchmarks in energy usage according to application and for exposing otherwise overlooked factors that cause the basic unit to fluctuate.

We have been somewhat successful in reducing CO<sub>2</sub> emissions through investment in energy-saving equipment. But to achieve sustained reduction in energy consumption, we will implement a companywide system for basic unit management using automatic energy readers that will identify areas of energy waste previously undetected. Once we know where energy is being wasted, we can stop it.

## CO<sub>2</sub> Reduction through Investment in Energy-Saving Equipment

We introduced 750kW photovoltaic power generation equipment at Nagoya Works 1 and a similar 100kW system at the Akashi Works. We expect a combined-factory CO<sub>2</sub> reduction effect of about 400 tons per year. The equipment was installed using financial assistance from the New Energy Promotion Council. The installations at Nagoya Works 1 and the Akashi Works bring the number of photovoltaic power generation systems to 10 at six domestic facilities, with total output of around 1,500kW.

We have been upgrading factory and office lighting systems and installed about 15,000 lighting fixtures with energy-saving bulbs in fiscal 2011. Plans for fiscal 2012 call for a similar number of new units, which should trim overall CO<sub>2</sub> emissions by about 1,500 tons per year.



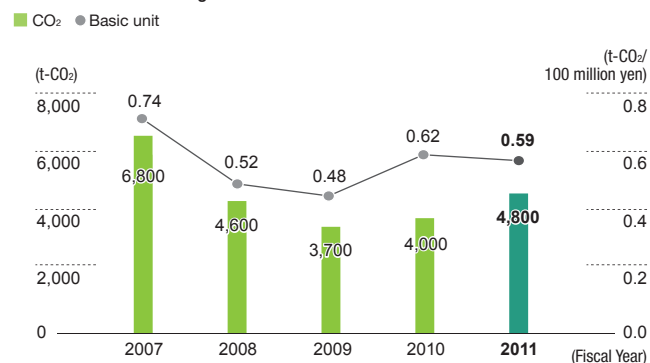
Photovoltaic power generation equipment with 750kW output installed at Nagoya Works 1

## Environmentally Conscious Logistics Processes

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 x 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 2011, CO<sub>2</sub> emissions reached 4,800t-CO<sub>2</sub> and the basic unit improved 5% over fiscal 2010, to 0.59 point.

We will strive to cut CO<sub>2</sub> emissions even further by boosting the load factor for truck transport and considering a modal shift from truck to other modes, such as train.

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



\*5 CO<sub>2</sub> basic unit is a measurement obtained by dividing CO<sub>2</sub> emissions by net sales.

\*6 CO<sub>2</sub> emissions in logistics processes are calculated from our position as a specified consignee (a Japanese legal designation applied to consignees that ship 30 million ton-kilometers of freight or more per year), under the revised Energy Saving Law.

\*7 CO<sub>2</sub> emissions from logistics processes are for KHI and do not include emissions by Kawasaki Shipbuilding Corporation and other subsidiaries before they merged into the Company on October 1, 2010.

\*8 The parameters for net sales, used in the calculation of the basic unit, are the same as those applied to emissions in \*7 above.

## Energy-Saving Efforts in the Office

Energy saving is not a pursuit consigned to production facilities alone. KHI encourages energy-saving initiatives, especially efforts to conserve electricity, in administrative divisions, including office buildings. Targets include computers and other office equipment as well as lights and air-conditioning, and measures are in place to eliminate waste wherever and whenever possible.

### Selected Results from Head Offices (Tokyo and Kobe)

Fiscal Year	2009	2010	2011
Office paper (1,000 sheets)	6,994	7,323	7,039

### Electricity Consumption at Head Offices (Tokyo and Kobe)

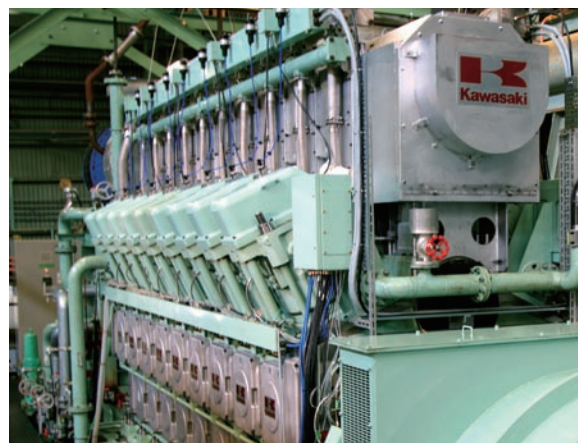
Fiscal Year	2009	2010	2011
Electricity (MWH)	1,054	1,026	1,025

### Concrete Examples

- Put electronic equipment, including computers and copiers, on power-saving settings
- Use minimum lighting in corridors and elevator halls
- Turn lights off during lunch break
- Institute no-overtime day and use partial lighting after the end of normal work hours
- Set air-conditioning at an energy-saving temperature, in line with Cool Biz and Warm Biz government initiatives
- Restrict supply of warm water in washrooms

## Cogeneration Systems at Facilities

We seek to optimize heat and electricity through the use of cogeneration systems. We have realized efficient application of on-site energy at the Akashi Works and the Gifu Works through the installation of a gas turbine cogeneration system developed in-house and at the Kobe Works through the installation of a similarly developed gas engine generator and binary turbine generator. Always in pursuit of lower CO<sub>2</sub> emissions, KHI not only manufactures power-generating equipment but uses it in its own operations as well.



Gas engine generator at Kobe Works

# Realization of a sound material-cycle society

## Waste Reduction Activities

### Amount of Waste Produced and Recycling Rate

It is our stated goal to engage in manufacturing that uses resources without waste in order to recycle and fully utilize limited resources. We undertake various activities to achieve this goal.

Among efforts to reduce waste, we promote the reuse and recycling of waste oil and constantly push zero-emission activities designed to recycle 100% of the waste emitted from our works without resorting to simple incineration or disposal as landfill.

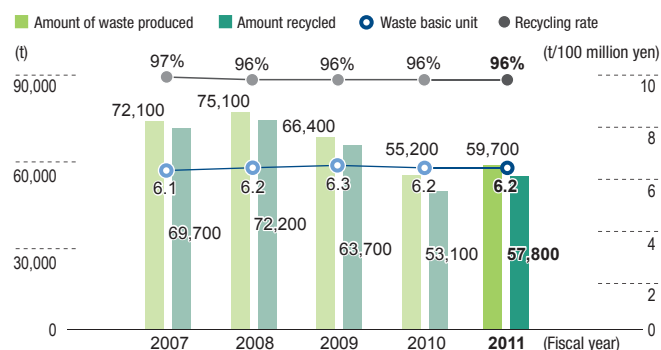
#### Common activities at all works

- Activities to reduce three substances with greatest waste emissions (metal scrap, waste oil, wood scrap)
- Promote resource saving, 3Rs
- Maintain and enhance zero emissions status
- Promote implementation of electronic manifests

As a result of these efforts, our recycling rate in Fiscal 2011 reached 96%, which is the same as in Fiscal 2010. Due to the increase in production volume because of a recovery in capacity utilization at our facilities, the total amount of waste emission in Fiscal 2011 was about 59,700 tons, which is an 8% increase from previous fiscal year.

In addition, our basic unit (i.e., waste emissions per net sales) was 6.2 points, the same as in fiscal 2010. We set fiscal 2003 as a reference year for the basic unit and are striving to achieve our target—a 12% decrease from the fiscal 2003 level by fiscal 2013. We analyze the success of common activities implemented throughout the Group and promote effective measures to achieve our target.

Amount of Waste Produced and Recycling Rate



### On-Site Inspection of Industrial Waste Treatment Businesses

At least once every two or three years, as a responsible waste-discharging business committed to the appropriate treatment of industrial waste, we perform an on-site inspection at each of the facilities operated by the businesses to which waste-treatment services have been outsourced. KHI personnel assigned to such inspection duties visit service sites to confirm that industrial waste generated by the Company is treated as per conditions set forth in respective contracts. Personnel also verify permit validity, prepare on-site confirmation reports and upload to the in-house intranet any information that should be shared across the Company.

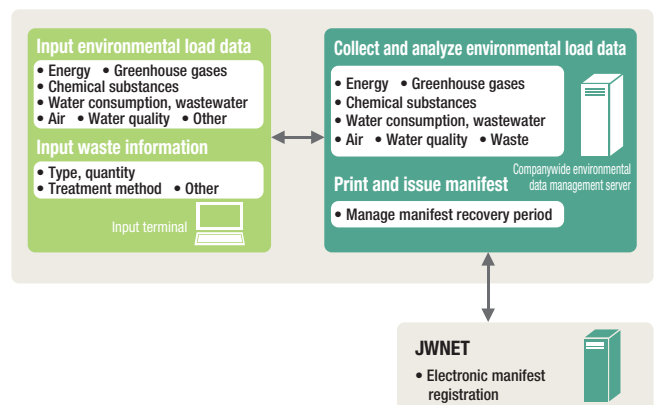
### Proper Disposal of PCB Waste

In accordance with the Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes, also known as the PCB Special Measures Law, we report to the appropriate prefectural government by June 30 each year any polychloride biphenyl (PCB) waste found at our operating sites. Also, until treatment is completed by Japan Environmental Safety Corporation (JESCO), we are required under the Waste Management and Public Cleansing Law—the Waste Management Law—and the cabinet and ministerial ordinances to appoint a manager for each business location where specially controlled industrial waste was discharged and to store such waste with the utmost care in line with applicable storage standards.

### Applying Electronic Manifest and Building In-House Management System

In the course of implementing an improved environmental data management system, we are configuring an in-house management system that interfaces with the electronic manifest system JWNET. Through this, we will not only achieve integrated management of environmental data from all facilities at the head office, we will also ensure thorough compliance through the electronic manifest system and reduce the man-hours needed to process manifest slips.

#### Environmental Data Management System



# Realization of a society coexisting with nature

## Reducing Chemical Substances

It is our stated goal to contribute to reduced environment impact and conservation of the ecosystem through manufacturing that is in harmony with global environment. We undertake various activities to achieve this goal.

Among efforts to reduce chemical substances throughout the Group, we have set targets in every business segment for major VOCs, dichloromethane, and hazardous heavy metals, and each segment has embraced the necessary approaches. The status of the efforts to reduce major VOC, hexavalent chromium 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.

### Major VOC

Concerning major VOC, we promoted the reduction of VOC from painting processes by switching to low-VOC paints such as water-base paint and improving coating efficiency by electrostatic coating. We also reduced cleaning solvents by installing solvent recovery equipment and dry ice blasting equipment. Although there are some reasons to prevent us from reducing VOC, like the increase of production amount, User's designation of paint and the change of international painting standards, our VOC emissions decreased from the previous year.

### Hexavalent Chromium

Through efforts to use chrome-free paint, the number of divisions that were able to eliminate the use of hexavalent chromium increased. However, hexavalent chromium is often used in special surfacing processes, and while we are

trying to implement technologies that do not use hexavalent chromium and are making progress at replacing it, the amount handled actually increased over the previous year.

### Lead

Lead is often found in paint, so our efforts have focused on switching to lead-free paint. Many divisions have eliminated lead use, or plan to, and the amount handled drastically decreased from the previous year.

The seventh plan, which began in Fiscal 2011, contains the basic policy of driving down the use of chemical substances under control to the absolute minimum (as a rule, totally eliminating heavy metals) by Fiscal 2021. This policy will guide our further reduction activities.

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

Substance		Fiscal 2011	Increase or decrease from fiscal 2010
Major VOCs	Toluene	321	+5.2%
	Xylene	633	-12.0%
	Ethylbenzene	326	+0.6%
	Total	1,280	-5.0%
Dichloromethane		45	-11.8%
Hazardous heavy metals	Hexavalent chromium	27	+22.7%
	Lead	1.7	-29.2%
	Cadmium	0.027	-77.5%

Notes: \*1 Amounts of major VOCs and dichloromethane are the amounts emitted, while that of hazardous heavy metals is the amount handled.

## For a 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, promote activities to protect biodiversity. We will support efforts to achieve this objective by implementing the activities listed on the right at all business sites with biodiversity protection in mind.

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

### Efforts to Reduce Environmental Load from Business Activities

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

### Non-Business Activity Efforts

- 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

# Consideration for the Environment in our products

## Main Efforts of the KHI Group

The KHI Group believes that one of the pillars of our Group Mission is to contribute to the environment through our products. We will make thorough efforts in implementing product assessments and complying to overseas laws and regulations and voluntary regulations in industry, and will continue to promote consideration for the environment in our products in the entire KHI Group.

### Product Assessment

For newly developed and designed products, as well as for particularly important products, we assess 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 respective products.

Main evaluation items of product assessment are as shown right.

- 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 by the establishment of such controls as the ELV Directive, the RoHS Directive, and the REACH Regulation. 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 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). We also apply this directive to some Precision Machinery Company products.

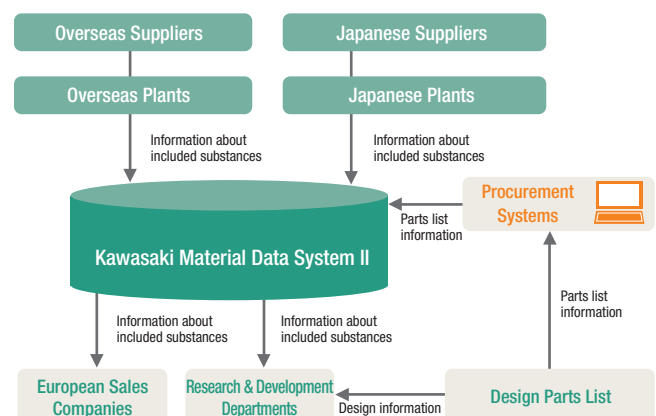
The REACH Regulation went into effect in June 2007 and applies to all chemical substances manufactured in and imported to the European Union. Businesses that manufacture or import chemical substances in quantities of one ton or more must register those substances. The products made by KHI are primarily articles and not all of them need to be registered. However, all substances that are released intentionally, and substances of very high concern, such as those with carcinogenic properties, require registration with or notification to the appropriate authorities. Regulations also 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. Since legal requirements (such as controlled substances and products) are different from one country to

another, we think it is important to understand laws and regulations and take necessary approaches.

The Rolling Stock Company, Motorcycle & Engine Company, Precision Machinery Company and Robot Division practice “green procurement” (see p. 24 of booklet version) and respond to requests from customers to gather chemical substance information. Besides that, the Motorcycle & Engine Company has created the Kawasaki Material Data System II to collect data about chemical substances and respond to REACH and other chemical substance regulations.

#### Response to REACH in 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

## Efforts by the Motorcycle & Engine Company

### Cleaner Exhaust Gas

In fiscal 2011, we maintained the focus from previous fiscal years—achieve cleaner exhaust from motorcycles sold in the domestic market—and launched the W800 with superior environmental performance and improved intake and exhaust systems that ensure levels conforming to 2007 Japanese emissions regulations. The W800 is the result of a committed pursuit to recreate the riding feel and beauty of a vintage motorcycle.

Boasting precise fuel metering, thanks to an electronically controlled fuel injection system using throttle body with sub-throttle<sup>\*4</sup>, and a muffler with large honeycomb catalysers and optimized inner construction and shape, the W800 not only contributes to cleaner exhaust gas but also clears noise regulations as well.

We also launched the Ninja 400R, an authentic all-round sport motorcycle, and the ER-4n, a stylish naked sport motorcycle. Both motorcycles are equipped with fuel-injection system using throttle body with sub-throttle, and three-way catalytic converter. Thanks to them, both motorcycles achieve high-level environmental performance conforming to 2007 Japanese emissions regulations.



W800

<sup>\*4</sup> Throttle body with sub-throttle: A device equipped with both a manually controlled throttle and an electronically controlled throttle for the purpose of optimizing the control of intake air mass.

### 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 2011, we achieved a recycling rate of 89.1%. From October 2011, we plan to eliminate the user burden of recycling 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 three Rs—

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 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 JAMA).

### 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® watercrafts, there are no Japanese regulations like the JAMA voluntary reduction targets, but we are making elimination and reduction efforts that follow those applied for motorcycles, and we had achieved voluntary reduction targets for lead, mercury and cadmium by fiscal 2008. Hexavalent chromium had been contained in a very small amount of parts, but we completed its elimination in fiscal 2009.

Japan Automobile Manufacturers Association “Reduction targets for environmental substances of concern” for new vehicles

Substance	Reduction target
Lead <sup>*5</sup>	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 <sup>*6</sup> )
Hexavalent chromium	Use prohibited in and after January 2008
Cadmium	Use prohibited in and after January 2007

<sup>\*5</sup> Used batteries are already recycled and excluded from the target values

<sup>\*6</sup> Combination lamps, discharge headlamps, etc.

# Environmentally Conscious Products

## Transportation-Related Products

In shipbuilding field, we develop and build a variety of products, such as LNG carriers and LPG carriers. In response to the demand for increased fuel efficiency, we are working to develop technologies for optimizing hull forms and increasing the efficiency of propulsion systems.

In rolling stock field, we manufacture a wide range of products, such as Shinkansen bullet trains. In addition to enhancing energy efficiency of rolling stock, we are pursuing energy savings for overall railway systems by developing equipment such as a battery power system for railways.

In aerospace field, we contribute to the advancement of the world's aircraft by jointly developing and manufacturing with leading American and European enterprises.

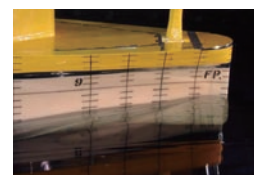
### 1 LPG Carrier Energy-Saving Technology: SEA-Arrow (Sharp Entrance Angle bow as an Arrow) Ship Design

LPG carriers are required to have box-shape tanks arranged forward of the bow for the purpose of efficient arrangement of LPG tanks, so, conventional bow shape generate high wave to form around the bow part during open-sea operation.

New developed bow shape, SEA-Arrow having no protrusion of bulb, keeping the effect of bulbous bow, thereby high propulsive performance is obtained by minimizing the bow waves. In addition, this design offers maximum fuel economy thanks to an ultra-long stroke, low-speed diesel engine for main propulsion and a Kawasaki rudder bulb with fins which reduces energy loss around the propeller.

KHI also gave thought to environmentally conscious features, such

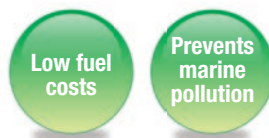
as double-hull construction for the fuel oil tanks, to prevent marine pollution. To date, we have delivered 15 SEA-Arrow LPG carriers, which have been very well received.



SEA-Arrow ship design model



LPG carrier



### 2 Megawatt Superconducting Motor for Ship Propulsion: Highest Domestic Output

KHI has been developing a superconducting motor that can deliver substantial energy saving with research organizations in both the public and private sectors under the support of the New Energy and Industrial Technology Development Organization (NEDO). Verification tests conducted by the Corporate Technology Division with a pilot unit demonstrated the highest output ever achieved with a superconducting motor in Japan and an efficiency rate of 98%.

Superconductivity is a phenomenon that occurs in certain materials: When cooled to ultralow temperatures, they exhibit absolutely no electrical resistance. If this inherent capability can be harnessed, it could significantly boost the efficiency of various devices and systems. KHI has been moving steadily forward on the development of superconducting motors for tomorrow's large-ship propulsion engines and for large

industrial drive systems. As an example, a vessel with a propulsion system utilizing superconducting motor technology would benefit from the high efficiency and the compactness, cutting fuel costs by about 20% compared with ships powered by conventional propulsion systems. Currently, KHI is developing a 3MW service model that will be the world's most efficient superconducting motor and boast the world's smallest footprint.



Superconducting motor pilot unit



### 3 New York Subway is Site for First Overseas Test of Battery Power System (BPS)

GIGACELL, a large-scale nickel-metal hydride battery developed exclusively by KHI enables rapid charging and discharging and quick control response. KHI utilized these features to develop a wayside energy storage system for railways called the Battery Power System (BPS) that contributes significantly to enhanced energy savings and reduced CO<sub>2</sub> emissions. This BPS stores energy—specifically, regenerative energy produced when a train's brakes are applied—for later use. It is this recycling of regenerative energy that optimizes energy saving.

Thus far, the system has caught the eye of the Osaka Municipal Transportation Bureau and, as of fiscal 2011, is being used at a substation on the Tanimachi Subway Line. Verification tests

performed jointly with Tokyu Corporation have demonstrated the potential for high energy savings and lower CO<sub>2</sub> emissions by using BPS. These results were further complemented by the success of a test overseas—our first outside Japan—on a BPS installed between two substations along a stretch of the New York City Transit's A Line.



Battery power system for railways (New York subway verification test)





## 4 KHI Ships Out First IPC Module for Trent XWB State-of-the-Art Passenger Aircraft Engine

The Trent XWB, the newest model in the Trent engine series from Rolls-Royce of the United Kingdom, has been tapped to power the A350XWB, a state-of-the-art passenger aircraft currently under development by Airbus S.A.S. in Europe. This engine improves fuel efficiency by about 15%, compared with existing engines, and dramatically reduces noise as well as CO<sub>2</sub> and NO<sub>x</sub> emissions.

KHI has been participating in the project to develop and produce this engine and has played a key role in joint design and development efforts with Rolls-Royce, but our primary responsibility has been the design, manufacture and assembly of the intermediate pressure compressor (IPC) module. One of eight main modules that comprise the engine, the IPC module increases the pressure of air drawn in through the fan and delivers this highly compressed

air to the combustion system.

KHI has supplied IPC components since March 2010 but this is the first time that we have completed the entire process, from parts manufacturing through to assembly, culminating in its first IPC module shipment in March 2011.



A350XWB® Airbus



Trent XWB intermediate pressure compressor module

## Industrial Plant and Equipment

We are offering around the world a variety of products that support the foundations of industry, including, large-scale plants for cement, chemicals and nonferrous metals, and industrial equipment such as steam turbines, aerodynamic machinery and other prime movers, as well as industrial robots, hydraulic equipment, and other civil engineering machinery.

The field of plant and industrial equipment constantly requires not only high performance but also lesser environmental impact, such as energy and resource conservation and more compact sizing. We continue to develop new products with advanced technologies to meet these needs.

## 5 KHI Delivers Cement Plant to Vietnam: Features High-Performance Dust Collection and Low-Noise, Low-Vibration Systems

In February 2011, KHI delivered a cement plant to But Son Cement Joint Stock Company, a subsidiary of Vietnam Cement Industry Corporation, a state-owned company controlled by the Ministry of Construction. This was an expansion project to add capacity at an existing cement plant. The plant is one of Vietnam's large-scale cement plants with production capacity of 4,000 tons/day and provides integrated production, from raw material receiving to grinding, burning and cement shipping.

KHI is responsible for the design and delivery of a full set of process equipment/machines used in the line from raw material receiving to cement shipping, as well as supervising on construction, erection, and commissioning. In the last few years, Vietnam has joined so many other nations around the world in establishing tougher environmental requirements, and cement producers are increasingly keen to procure energy-saving equipment for their

plants. The recently delivered cement plant features a high-efficiency dust collecting facility and low-noise, low-vibration systems that will contribute significantly to reduced environmental impact. In addition, We provided operating instructions so that no energy or heat would be wasted during operation.

To date, KHI has delivered around 90 cement plants to customers in Japan and overseas.



Cement plant in Vietnam

## 6 Launch of 400kW-Class Kawasaki MAG Turbo: Dramatically Boosting Energy Savings at Sewage Treatment Plants

Aeration blowers are used at sewage treatment plants to supply air to bioreactors where sanitary wastewater is cleaned by microorganisms. These aeration blowers consume 40% to 50% of the total electricity needs at a sewage treatment plant, prompting demand for greater efficiency and energy-saving features in such equipment.

KHI meets these market demands with the Kawasaki MAG Turbo, a single-stage blower with a high-speed motor and magnetic bearings. Recently, We expanded the lineup with the newly developed 400kW-class MAG-M35, the largest model to date.

The Kawasaki MAG Turbo features an integrated design, with the impeller attached directly to the rotor of an inverter-driven, high-speed motor, and magnetic bearings in the rotor shaft. This structure allows

high-speed rotation without mechanical contact for enhanced efficiency and substantial energy savings and also reduces noise and vibration.

KHI has received over 60 orders for the Kawasaki MAG Turbo since the blower series debuted, and with a selection of systems capable of handling air volume between 30m<sup>3</sup> and 300m<sup>3</sup> per minute, the series will meet the needs of a wide range of customers.



400kW-class Kawasaki MAG Turbo

# Environmental Solution Products

## Energy-Related Products

We have numerous high-performance products, including gas turbines, gas engines and various types of boilers, and we are providing a range of energy systems that incorporate these products to locations around the world. We are also working on renewable energy technologies (woody biomass power generation, photovoltaic power generation, small-scale hydraulic power generation, etc.) and clean energy technologies (hydrogen and LNG facilities, etc.).

As to gas turbines, we have an article entitled “Developed the L30A new-model gas turbine for power generation” in the CSR report 2011 booklet version (P.13).



L30A gas turbine

### 1 First Order for Kawasaki Green Gas Engine, with World’s Highest Electrical Efficiency

In March 2011, KHI received an order from a major Japanese chemical maker for a cogeneration system using the 7,800kW Kawasaki Green Gas Engine. With electrical efficiency of 48.5%—the world’s highest—and NOx emissions below 200ppm (O<sub>2</sub> = 0%), the revolutionary Kawasaki Green Gas Engine presents excellent cost-efficiency and environmentally friendly qualities. Specifically, compared with other gas engines in the same output class, the Kawasaki Green Gas Engine cuts fuel costs by more than 5% and its low NOx level obviates the need for NOx removal equipment under normal circumstances. In addition to being compact and lightweight, the Kawasaki Green Gas Engine features an electric spark ignition system, which precludes the use of liquid fuel, so it

can maintain high electrical efficiency over a wide operating range from 30% to 100%.

KHI constructed the Kobe Power Center, a 5,000kW in-house power plant driven by the Kawasaki Green Gas Engine, at its Kobe Works to acquire greater know-how on in-house power generation solutions through practical operation of its own system.



Kawasaki Green Gas Engine at Kobe Power Center

### 2 Waste Heat Recovery Power Generation (WHRPG) in Cement Plant

KHI’s waste heat recovery power generation (WHRPG) in cement plant works by recovering heat from exhaust gas released in the cement production process. This system is drawing attention from around the world as a clean power-generating technology that does not emit CO<sub>2</sub>. The system can generate enough power to cover about 30% of the total electricity needs of a cement plant.

KHI has expertise in waste heat boilers, which can tolerate high-temperature gas above 1,000°C and exhaust gas containing large amounts of dust, and its waste heat boilers for cement plants, with very challenging requirements, are known for their high reliability. Since delivering its first WHRPG in cement plant in 1980, we have built more than 160 systems for cement plants in Japan and overseas. Some of

these projects are still under construction. Many orders for these systems have been received, mainly from China and other parts of Asia, including South Korea, but also from Europe, including Germany and Turkey.

Aggregate power generation by systems in use is around 1,900MW, which has contributed to a reduction of more than 13 million tons of CO<sub>2</sub> emissions per year.



WHRPG in cement plant in Pakistan

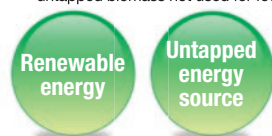
### 3 Successful Production of Bioethanol from Rice Straw

Working with Akita Agriculture Public Corporation, KHI participated in an initiative launched by Japan’s Ministry of Agriculture, Forestry and Fisheries to establish bioenergy technology utilizing soft cellulose<sup>\*1</sup>. We were responsible for the production of bioethanol and road tests using the fuel, while Akita Agriculture Public Corporation was responsible for raw material gathering and transportation. In October 2010, verification tests using rice straw to produce bioethanol suitable for automotive fuel were successful. The demonstration plant, in Katagami, Akita Prefecture, can produce as much as 200 liters per day. KHI designed and built the entire plant, from pretreatment facilities to saccharification, fermentation, distillation and dehydration processing facilities. The plant utilizes proprietary breakthrough bioethanol production technology using heated water to

saccharify rice straw. This technology cuts the cost of production since it does not use sulfuric acid or enzymes, which the conventional saccharification process requires.

The demonstration will continue through the fiscal 2013, with the goal to reduce the cost of production to a level favorable to commercialization.

\*1 An open project by the Ministry of Agriculture, Forestry and Fisheries to establish technology for producing biofuel from soft cellulose, such as rice straw, an untapped biomass not used for food use.



Bioethanol demonstration plant

## Waste Treatment and Environmental Pollution Prevention Products

We began developing waste treatment technologies early on, and we currently have various such technologies for treating urban refuse, including stoker-type furnaces, fluidized bed gasification and melting furnaces and direct gasification and melting furnaces. We have delivered leading-edge waste treatment systems all over Japan.

To prevent pollution, we have worked with a number of technologies to protect and improve air and water quality. We have addressed boiler and other combustion gases since the 1970s by developing flue-gas desulfurization systems, and have delivered a number of these in Japan and abroad, where they are improving air quality.

### 4 KHI Awarded Municipal Contract for Combined Waste Incineration/Biogas Generation Complex

In June 2010, KHI received an order from the city of Hofu, Yamaguchi Prefecture, for a combined waste incineration/biogas generation complex—the first of its kind in Japan. The complex will include a sorting facility, where organic waste appropriate for biogas generation is separated from combustible waste, and a biogas generation facility, where the separated waste is converted into biogas using a dry thermophilic methane fermentation process. Any remaining waste and methane fermentation residue will be incinerated at a high temperature under a low air ratio in a parallel flow incinerator with mechanical stoker for efficient energy production. The combination of sophisticated waste-processing technologies boosts the efficiency of energy recovery

for the entire complex and delivers superior performance, with maximum generating capacity of 3,600kW and generating efficiency of 23.5% under normal waste-processing operations. Electricity generated on-site is sufficient to power the entire complex with surplus available for sale to local power companies. This contributes to reduced CO<sub>2</sub> emissions.

Note: This complex received an award in the 10 Best New Products category at the 53rd awards event in January 2011, sponsored by *Nikkan Kogyo Shimbun*.



Combined waste incineration/biogas generation complex

### 5 Flue-gas Desulfurization Systems Utilized in Japan and Abroad

Flue-gas Desulfurization Systems remove sulfur oxides from the exhaust gas emitted by power generation boilers and various types of industrial boilers for the purpose of preventing air pollution. We have experienced about 40 years of research and improvements to complete the development of technologies that offer high performance, outstanding energy-saving and reliability. Kawasaki has delivered 42 flue-gas desulfurization plants to various industries and electric power companies in Japan and 59 plants abroad, including China, Southeast Asia and Europe. We also license technologies abroad. In recent years, we are promoting R&D for developing

countries and the standardization of design, and we are making efforts to put a competitive price in addition to energy and resource saving through such measures as developing compact absorption towers.



Flue gas Desulfurization System (Saudi Arabia)

### Effect of CO<sub>2</sub> Emissions Reduction through Products (For major products delivered in fiscal 2011)

Field	Effect of CO <sub>2</sub> Emissions Reduction	Major Products	Technologies, Remarks
Energy-related products	313,000t-CO <sub>2</sub> /year	• Gas turbine cogeneration system	1, 2
		• Gas engine power generation system	1
		• Binary turbine power generation system	3
		• Waste heat recovery power generation in cement plant	3
		• High-efficiency boiler system	2
		• Absorption Chiller/Heater	2
Transportation-related products	38,000t-CO <sub>2</sub> /year	• Next-generation mid-sized Boeing 787 (reduced weight)	4, shared production
		• LNG carriers, LPG carriers, bulk carriers (improved propulsion capabilities)	4
Industrial equipment and other products	64,000t-CO <sub>2</sub> /year	• Sewage aeration blowers (Kawasaki MAG Turbo series)	5
		• Electro-hydraulic hybrid system (Kawasaki Eco Servo)	5
		• Cement kiln-using plant turning waste into fuel	3
Total	415,000t-CO <sub>2</sub> /year	—	—

Technologies: 1. High-efficiency power generation; 2. High-efficiency energy use; 3. Waste heat/exhaust energy use; 4. Reduced fuel costs; and 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> emissions 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.