Theme 4

Environmental Activities

We will pursue "manufacturing that makes the Earth smile."

Promoting Environment Management

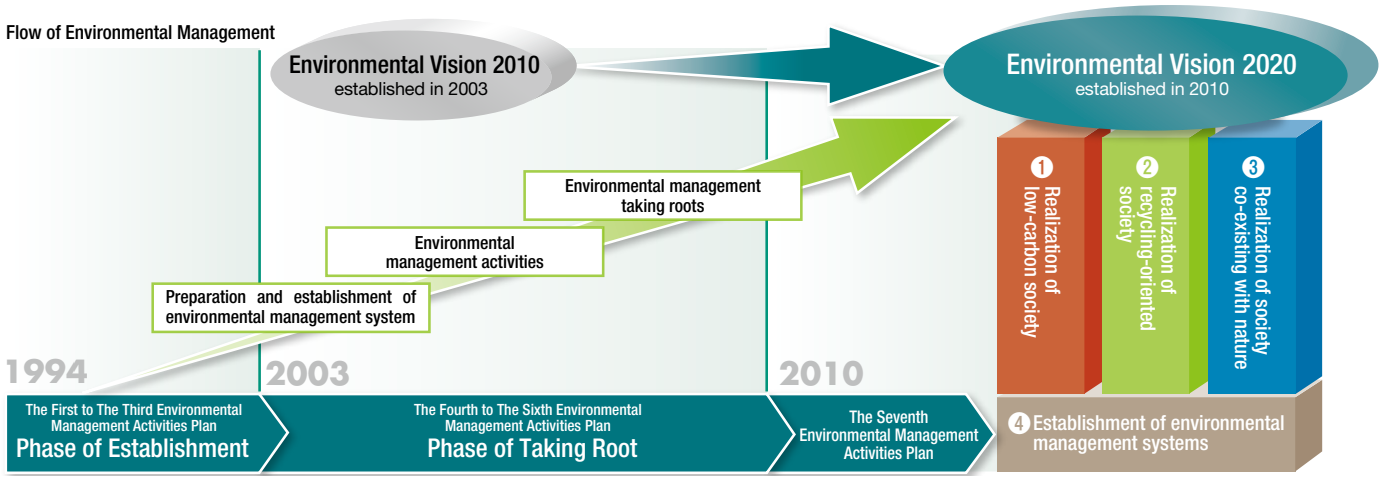
Establishment of Environmental Vision 2020

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

In fiscal 2011, KHI Group drafted Environmental Vision 2020, which seeks to define what the Group should be in 2020 from an environmental perspective under KHI's 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. KHI Group embarked on the Seventh 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 recycling-oriented 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, KHI Group aims to contribute to integrating business management and environmental management activities and contribute to a sustainable society.

To realize our social mission, KHI Group will continue to prioritize the environment as an important management theme and support solutions to global environmental problems through our products and services.



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 recycling-oriented 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

Entry Points of Sustainable Society

Realization of 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.

Vision for 2020

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

Realization of recycling-oriented 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 recycling-oriented society.

Vision for 2020

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

Realization of society coexisting with nature

Contribute to reduction of 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.
KHI Group 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.

Vision for 2020

❶Offer customers products and services that prevent air and water pollution, and advance environment improvements and ecosystem protection.
❷Reduce the use of chemical substances in products and production activities.
❸Cooperate 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

KHI Group aims 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.

Vision for 2020

❶Have an environmental management system (EMS) in place at every consolidated subsidiary in Japan and abroad and practice environmental management throughout the Group.
❷Comply with environmental laws and regulations and regularly follow up on compliance status.
❸Communicate environmental data within and beyond the Group and maintain two-way dialogue while protecting the environment.

Seventh Environmental Management Activities Plan Results of Fiscal 2012

The Seventh 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 low-carbon society, the realization of recycling-oriented society, and the realization of society coexisting with nature, as well as the establishment of environmental management systems to serve as a foundation for environmental management—that will enable KHI Group to realize our vision.

Seventh Environmental Management Activities Plan (Fiscal 2011–Fiscal 2013)

Realization of 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_2 emissions from our own production activities; make CO_2 more tangible to promote energy-saving activities Groupwide; create a verification system
   - Undertake Groupwide CO_2 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 KHI Group products and technologies in Japan and abroad (e.g., CDM)
3) Purchase emissions credits from trading market
   - Take precautionary measures in the event we do not meet CO_2 reduction targets
4) Acquire emissions credits by endowment or donation

Group target: By fiscal 2013, reduce our average amount of CO_2 basic unit (= CO_2 emissions per net sales) for fiscal 2009 through fiscal 2013 by 10%, compared with fiscal 2008

Realization of recycling-oriented 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

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Realization of society coexisting with nature Contribute to reduction of 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

1) Decide on biodiversity action guidelines and promote conservation

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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 the Seventh Environmental Management Activities Plan

Realization of low-carbon society

KHI Group is aiming to achieve our company-wide Fiscal 2013 objective for greenhouse gases, which is to reduce the average basic unit of emissions (meaning CO_2 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 recycling oriented society

KHI Group's measures to reduce total waste emissions include promoting conservation and the 3R movement.

Realization of society coexisting with nature

KHI Group has engaged in measures to reduce chemical substances, environmental contributions through our products and technology, and the like.

Establishment of environmental management systems

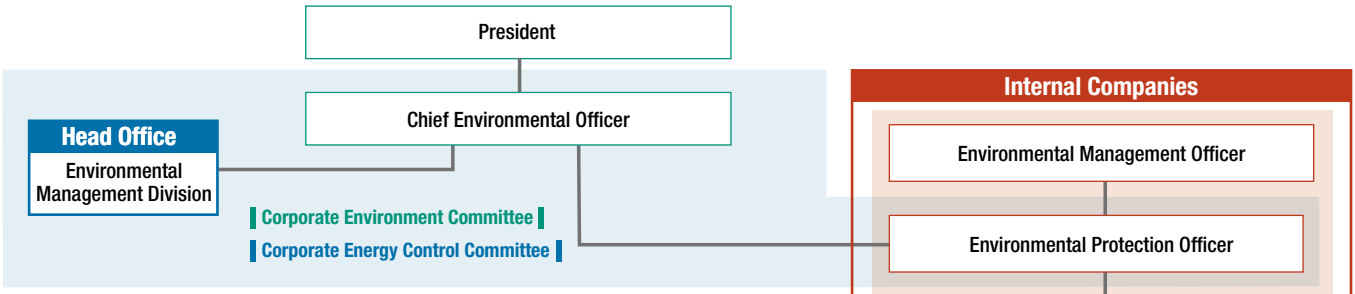
KHI Group has committed itself to promoting the establishment of EMS in all consolidated subsidiaries in Japan and overseas. Also, we have committed ourselves to environmental risk management and employee education.

Environmental Activity Results of Fiscal 2012	Evaluation
1. Global warming prevention measures **1) Reduce CO_2 emissions from our own production activities** •Introduce system to make CO_2 emissions tangible (includes response to Revised Energy-Saving Law); operate system at pilot plant, collect and distribute energy-saving know-how in-house; •Undertake Groupwide CO_2 reduction measures (energy-saving capital investment) •Implement energy-saving capital investment (factory and office lighting, energy-saving inverters) and verify the results of such energy-saving measures •Strengthen energy-saving activities in each segment and follow through on plans •Establish corporate energy-saving promotion structure **2) Acquire emissions credits with KHI Group products and technologies** •Consider responses to new measures that fight global warming) **3) Purchase emissions credits from trading market** •Examine burden of purchasing portion of reduction targets not achieved **4) Acquire emissions credits by endowment or donation** •Forest conservation activities, use of green electric power, etc.	○
1. Activities to reduce total waste emissions **1) Activities to reduce three substances with greatest waste emissions (metal scrap, waste oil, wood scrap)** **2) Promote resource saving, 3R** **3) Maintain and enhance zero emissions status** **4) Promote implementation of electronic manifests**	○
2. Decide on proper treatment plan for PCB wastes and follow through with appropriate measures **1) Follow through on JESCO commissioned processing)** **2) Follow through on processing trends and number of processed units of equipment containing low-density PCBs**	○
1. Activities to reduce chemical substances **1) Perform critical point follow-through in departments stepping up reduction measures in the Seventh Plan** •Acknowledge and organize usage status, clarify issues and set targets •Promote implementation and follow through with low-VOC paints as well as heavy-metal-free painting and surface-processing technologies	△
2. Environmental contributions through products and technologies **1) Activities to reduce environmental impact over product life cycle** •Assess CO_2 reduction effects on products related to energy and transportation •Consider evaluation techniques for life cycle assessment •Report environmental contributions from products and technologies **2) Make products greener** •Respond thoroughly to laws and regulations (RoHS Directive, REACH Regulations, etc.) •Set standards for green products and boost sales of such products	△
3. Activities to protect bio-diversity **1) Promote conservation activities of bio-diversity in each business segment and on a company-wide basis.**	△
1. Build EMS for KHI Group **1) Devise and promote a plan for building EMS at consolidated subsidiaries in Japan and abroad** •In fiscal 2012, introduce EMS at five domestic subsidiaries and five overseas subsidiaries **2) Collect major environmental data for entire Group (energy, waste, chemical substances, etc.)** •Collect information from Group companies on energy/CO_2 emissions and disclose data to public	○
2. Thoroughly comply with environmental laws and regulations **1) Activities of Environmental Law and Regulation Compliance Status Review Committee** **2) Follow up on environmental law revisions, etc., and implement throughout the Group**	◎
3. Practice environmental communication **1) Awareness-raising activities for KHI Group employees (environmental education)** **2) Disclose environmental data within and beyond Group (issue environmental news, CSR Report, etc.)** **3) Company forest restoration program**	◎

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 Officer, Environmental Protection Officer, Senior Manager responsible for environmental protection, and 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 a coordinated effort among all employees to implement environment-oriented initiatives.



Corporate Environment Committee

This committee deliberates and decides the Environment Management Activities Plan (revised at triennial intervals) and the operation of priority initiatives of Environmental Management Activities (set annually).

Corporate Energy Control Committee

This committee sets out the energy control system and discusses and drafts yearly energy-saving polices and action plans applicable to the whole company and energy-saving action plans for the medium to long term.

Environmental Management Committee

This committee formulates three-year environmental management activity plans for each internal company and tracks the results achieved through company-specific activities.

Environmental Management System (EMS) Administration

All KHI production bases have acquired ISO 14001 certification. Currently, KHI Group is 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. All the 43 domestic subsidiaries that we targeted for EMS adoption had completed development of the necessary structure by the end of fiscal 2012. To date, KHI Group focused on principal factories, but under the Seventh Environmental Management Activities Plan, KHI Group will strive to expand the scope of EMS establishment at overseas locations. Of the 26 overseas subsidiaries that have been targeted for an EMS, Kawasaki Motors Enterprise (Thailand) Co., Ltd and other four companies completed implementation in fiscal 2012. Of the 14 companies that still have not established the EMS, we will advance the establishment of EMS in fiscal 2013, clarifying the policy corresponding to the business field and the scales, in accordance with local laws and regulations.

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

Kawasaki Heavy Industries

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	Nishikobe 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 Choutatsu Kiban Seibi Kyoukai (Defense Procurement Framework Establishment Association of Japan), DNV: Det Norske Veritas

Current Situations for EMS Installation for Subsidiaries

Subsidiaries in Japan

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

level 1 ISO14001 certification

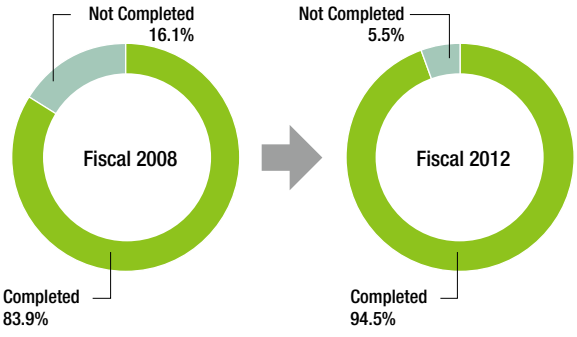
level 2 Simplified EMS certification

level 3 Self-declaration of EMS establishment

Subsidiaries Overseas

Oversight organization	Company	Location	Establishment level	Date of Establishment
Machinery	Wuhan Kawasaki Marine Machinery Co., Ltd.	China (PRC)	1	Jul. 2009
Plant & Infrastructure	KHI Design & Technical Service Inc.	Philippines	1	Nov. 2011
Motorcycle & Engine	Kawasaki Motors Manufacturing Corp., U.S.A.	U.S.A	1	Apr. 2003
	Kawasaki Motors Enterprise (Thailand)Co., Ltd.	Thailand	1	Dec. 2011
	KHITKAN Co., Ltd.	Thailand	1	Dec. 2011
	P.T. Kawasaki Motor Indonesia	Indonesia	3	Jan. 2012
	Kawasaki Motors(Phils.)Corporation	Philippines	3	Jun. 2012
Precision Machinery Company	Kawasaki Precision Machinery (UK)Ltd.	U.K.	1	Nov. 2001
	Flutek, Ltd.	South Korea	1	Nov. 2005
	Kawasaki Precision Machinery (Suzhou) Ltd. (China)	China (PRC)	1	Dec. 2007
Robot Division	Kawasaki Robotics(U.S.A.)Inc.	U.S.A	1	Feb. 2006
Head Office	KCMA Corporation	U.S.A	3	Mar. 2011

Proportion of Employees of Subsidiaries in Establishing EMS Structures



Compliance with Laws and Regulations

In fiscal 2012, there were no instances of judicial or administrative penalties.
However, KHI received two administrative warnings. One was for an accident that released acidic wastewater (from sulfuric acid) at the site of some construction work at the Gifu Works. The system that constantly monitors wastewater status quickly detected the problem and generated an alert so that steps could be taken immediately. As a result, pH value only slightly exceeded the allowable level.
The other was for irregularities found at the Akashi Works during an on-site inspection by a team of pollution regulators from Hyogo Prefecture. We installed corrective devices and implemented measures to address these irregularities.

Violations and Accidents during the Past 5 Years

Fiscal Year	2008	2009	2010	2011	2012
Judicial/Administrative Penalties	0	0	0	0	0
Administrative Measures	0	1	0	0	0
Administrative Warnings	3	4	0	2	2
Complaints from residents	2	4	0	5	0

- 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

Status of Laws and Regulations 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, In fiscal 2012 we have broadened the range of environmental impact data we collect from principal subsidiaries overseas, in addition to the energy consumption data collected from the fiscal 2011. Also, we are preparing to form the structure to reduce environmental risks by checking the actual situation of the oversea subsidiaries through onsite review by the Environmental Affairs Department.

Risk Management

Prompted by a NOx accident at the Akashi Works in February 2009, we established the Environmental Law and Regulation Compliance Status Review Committee in April of that year. In the last two years, the committee has inspected 16 facilities: that is, 11 sites run by KHI and five sites run by four subsidiaries where operations can have a considerable environmental impact. Issues requiring corrective measures have been largely resolved at all facilities and initial goals have been achieved, so the committee's activities will be suspended.
Going forward, we will continue to ensure awareness of revisions to environment-related laws and regulations and encourage managers responsible for environment-related activities to acquire additional qualifications. This will be achieved not through a committee format but rather through the establishment of a joint CSR liaison conference at which environmental management officers from our internal companies work together, guided by the secretariat—Environmental Affairs Department—to address CSR issues from a risk management perspective and thereby prevent environmental accidents before they happen.
In fiscal 2012, environmental management officers at KHI and principal subsidiaries attended a joint meeting. This was an opportunity to highlight changes to recently revised environmental laws and regulations, share the results of on-site inspections undertaken by the secretariat to confirm legal compliance at facilities.

Environmental Awareness Activities for Employees

Environmental e-Learning/Courses for People without Computers

To maintain and improve environmental awareness among employees throughout the 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 subsidiaries. In fiscal 2012, approximately 1150 people participated in the environmental e-learning courses. The attendance rate was 89%.
For employees who do not have access to a personal computer, we offer lecture-style classes. In the four years since these classes were first offered in fiscal 2009, we have had around 6800 people attend the lectures.

Environmental Awareness

KHI Group runs 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.

Message from the President concerning environmental management

Environmental News

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

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.

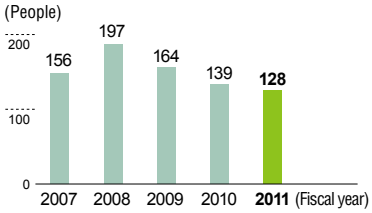
Number of Qualified Pollution Control Managers

Air	70
Water	74
Noise, Vibration	45
Others	78
Total	267

Number of Qualified Energy Managers

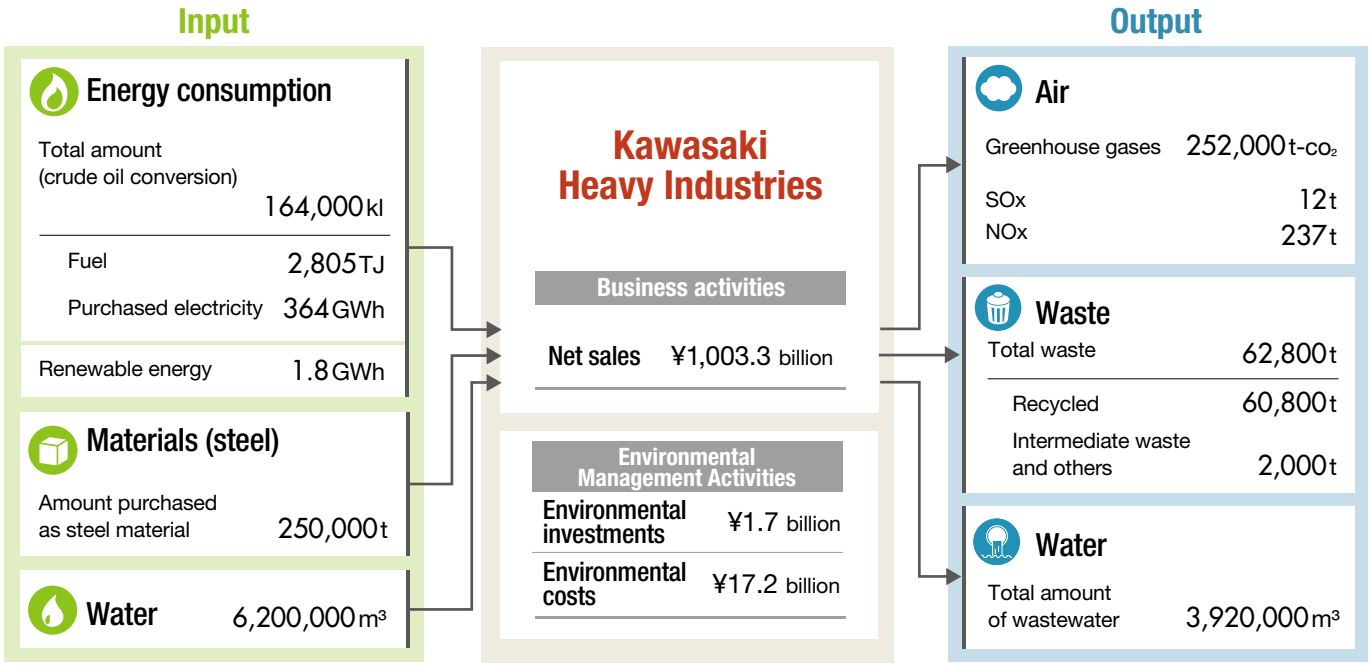
Energy Managers	39

Number of Newly Registered ISO 14001 Internal Environmental Auditors



Material Balance of Business Activities for Fiscal 2012 (Overall Picture of Environmental Impact)

KHI has put together a summary of the impact of our business activities on the environment during fiscal 2012. 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.



Environmental Accounting Calculations for Fiscal 2012

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.		847	2,974	Energy-saving cost reduction 175
	Efficient use of raw materials, water, and other resources		6	192	Resource-saving cost reduction 50
	Resource-recycling activities	Resource-recycling activities	70	726	Income from recycling 1,167
		Waste disposal costs	0	321	Waste disposal cost reduction 4
	Environmental risk control		650	1,722	2
	Subtotal		1,572	5,935	1,398
	Year-on-year comparisons		112%	125%	115%
Upstream/downstream costs			59	2,661	0
Management activity costs			3	452	0
R&D costs			87	7,876	0
Social activity costs			13	194	0
Environmental remediation costs			0	78	0
Total			1,735	17,196	1,398
Year-on-year comparisons			80%	109%	104%

Millions of yen

Item	Total
Total investments in fiscal 2011	47,404
Total R&D costs in fiscal 2011	37,916

Item	Proportion
Percentage of investments (Environmental investments 1,735/Total investments 47,404)	4%
Percentage of R&D costs (Environmental R&D costs 7,876/Total R&D costs 35,321)	21%

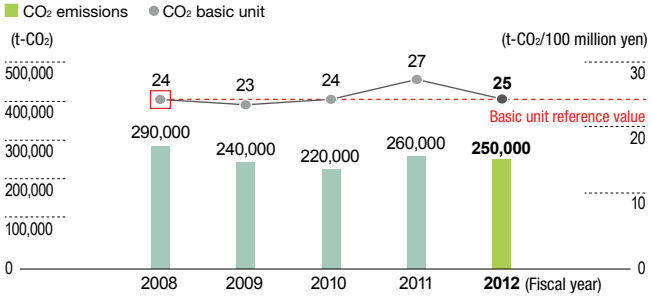
Realization of Low-Carbon Society

Reducing Greenhouse Gas Emissions

It is KHI's stated goal to contribute to the prevention of global warming through products and manufacturing that use energy without waste. Because 99% of the greenhouse gas emissions KHI generates through our business activities are CO_2 emissions from energy sources, KHI has implemented greenhouse gas reduction programs emphasizing a decrease in the usage of fossil fuel-derived energy. Our efforts include installation of photovoltaic power generation systems and conversion to high-efficiency lighting as well as progress in visualizing energy usage so that we can discover where energy is being wasted and then make the necessary changes to remedy the situation.

KHI's greenhouse gas reduction target is to achieve an average 10% decrease between fiscal 2009 and fiscal 2013 in our CO_2 basic unit, compared with the fiscal 2008 reference value. The results for fiscal 2012 showed a basic unit of 25t-CO_2/¥100 million— against the benchmark 24t-CO_2/¥100 million—indicating that it will be difficult to reach our target. However we will meet the target by using CO_2 credit to offset the shortage.

Changes in CO_2 Emissions and Basic Unit at KHI

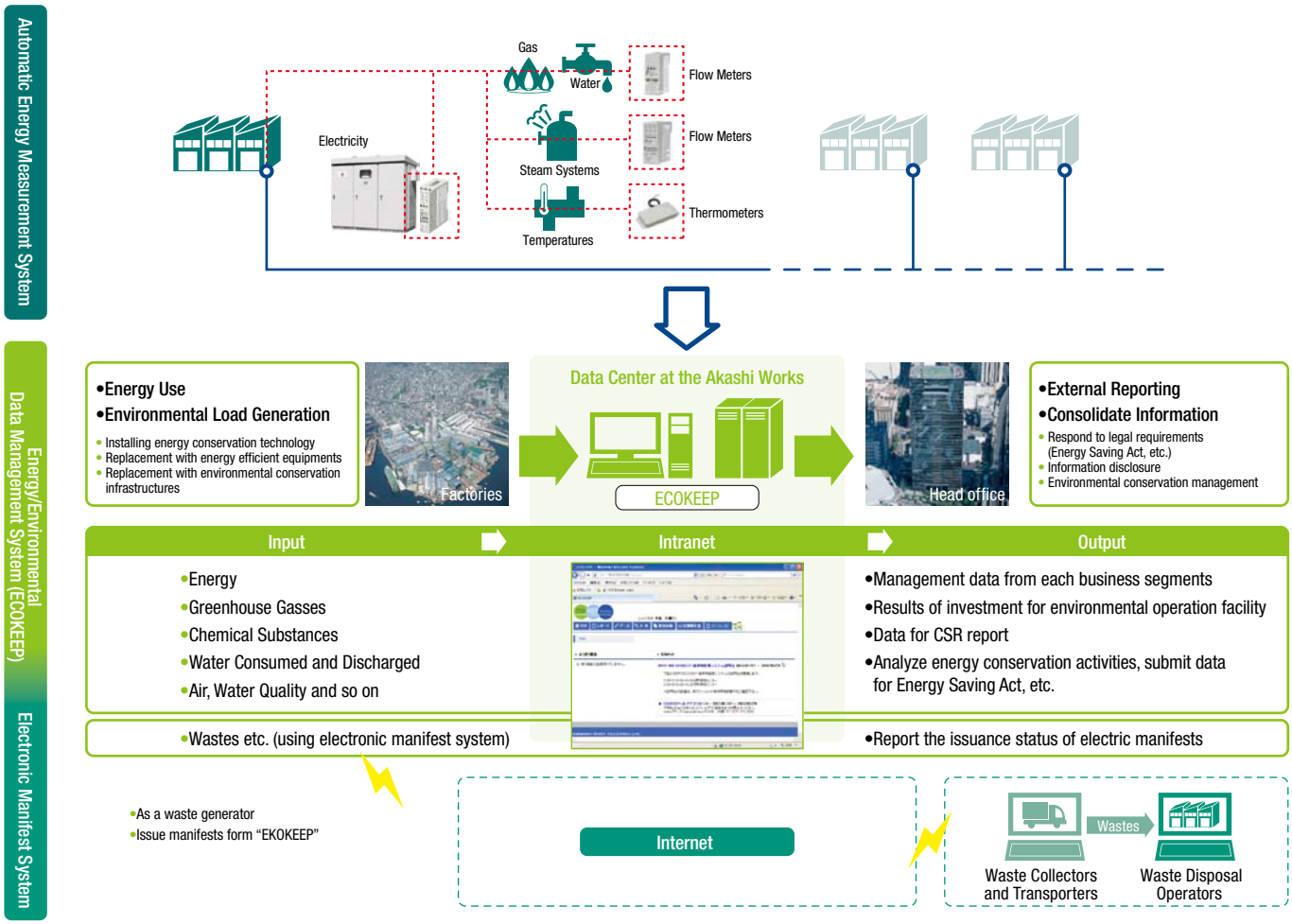


Note1 CO_2 basic unit is a measurement obtained by dividing CO_2 emissions by net sales.
Note2 CO_2 emissions in logistics processes are calculated from our position as a specified consignor (a Japanese legal designation applied to consigners that ship 30 million ton-kilometers of freight or more per year), under the revised Energy Saving Law.

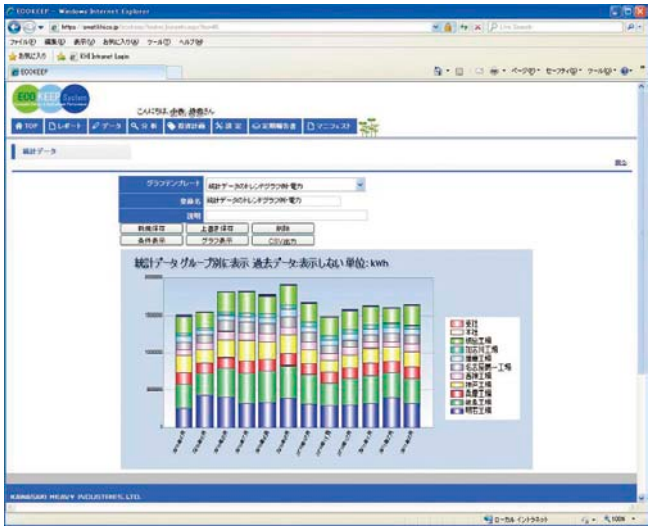
Reducing Energy Consumption

KHI has achieved some positive results in reducing CO_2 emissions through investment in energy-saving

System Structure Image



equipment. But to achieve sustained reduction in energy consumption, KHI has implemented a system using automatic energy readers. At the Kakogawa Works, we measure energy consumption to be about 350 points, covering most metered sources, including electricity, gas and compressed air. Consumption is displayed in real time to promote energy-saving activities. In addition, measurements are tallied up in a group-wide system and then analyzed, with the information made available for sharing within the Group.



an example of " ECOKEEP" monitor views

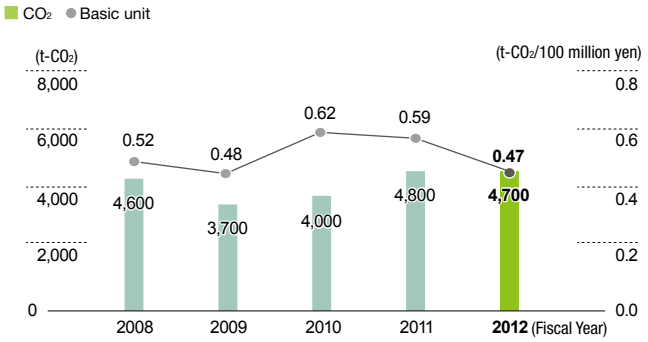
CO_2 Reduction through Investment in Energy-Saving Equipment

From fiscal 2011 through fiscal 2012, KHI upgraded plant and office lighting systems and installed about 14,000 light fixtures with high energy-saving bulbs at plants and about 16,000 at offices. Specifically, we switched plant lighting from mercury bulbs to metal-halide bulbs, which offer the same level of brightness but consume only about half the power, and we switched office lighting from conventional fluorescent bulbs to high-frequency fluorescent bulbs, which are 20% more energy-efficient. Through these efforts, we expect to reduce CO_2 emissions by about 2,600 tons per year.

Environmentally Conscious Logistics

KHI promotes energy-saving activities and data tracking to curb CO_2 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 2012, CO_2 emissions reached 4,700t-CO_2 and the basic unit improved 20% over fiscal 2011, to 0.468 point. We will strive to cut CO_2 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_2 Emissions from Logistics Processes



*1 CO_2 basic unit is a measurement obtained by dividing CO_2 emissions by net sales.
*2 CO_2 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.
*3 CO_2 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.
*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.

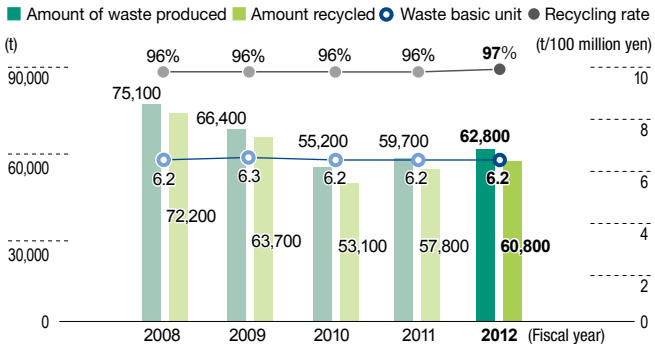
Realization of Recycling-Oriented Society

Efforts toward the Waste Reduction

Waste Reduction Activities

Taking real world trends into account, KHI defines zero emissions as a final waste processing ratio below 1%.
In fiscal 2012, all plants reached zero emission status. Going forward, we will not rest on our laurels but rather strive to improve upon this achievement.
In terms of output, KHI recorded an increase in the total amount of waste in fiscal 2012, mainly because production expanded to keep pace with higher sales, we marked a year-on-year increase of about 5%, to roughly 62,800 tons of waste. Our basic unit—waste emissions per net sales—held steady at 6.2 points.
KHI's recycling rate was 97% in fiscal 2012.

Amount of Waste Produced and Recycling Rate



On-Site Inspection of Industrial Waste Treatment

As a responsible waste-discharging business committed to the appropriate treatment of industrial waste, KHI performs an on-site inspection, basically once every two years, 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.

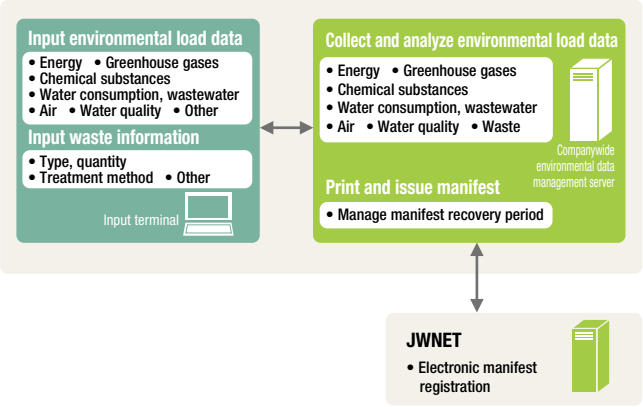
Proper Disposal of PCB Waste

In accordance with the Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes, also known as the PCB Special Measures Law, KHI reports 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.
In December 2011, KHI undertook our first disposal of condensers—114, in this case—through JESCO.

Installing Electronic Manifest System and Building In-House Management System

In the process of rebuilding an in-house management data system, KHI aims to achieve a structure that interfaces with the electronic manifest system "JWNET". The system will be fully operational in fiscal 2013. 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 Society Coexisting with Nature

Reducing Chemical Substances

It is KHI's stated goal to contribute to reduced environment impact and conservation of the ecosystem through manufacturing that is in harmony with global environment. KHI undertakes various activities to achieve this goal. Among efforts to reduce chemical substances, KHI has 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 VOCs, dichloromethane, 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 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, and also reduced our use of cleaning solvents by installing solvent recovery equipment. We encountered some challenges, such as production increases and customer-specified painting requirements, which prevented us from successfully achieving our VOC-reduction goal and caused emissions to go beyond the fiscal 2011 level. Moving forward, 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 our operations. With an increase in production volume, emissions grew over fiscal 2011. Moving forward, KHI will strive to reduce emissions, especially through enhanced recovery methods.

Hexavalent Chromium

Hexavalent chromium is often used in the special surfacing processes that we use in KHI's operations. KHI is keen to introduce technologies that do not utilize hexavalent chromium, but we will need more time before alternative processes are fully adopted. Nevertheless, the amount of hexavalent chromium handled in fiscal 2012 decreased over fiscal 2011, and we will continue to systematically apply potential replacements, such as chrome-free paint.

Lead

Lead is often found in paint, so KHI's efforts have focused on switching to lead-free paint. KHI is working on reducing lead use, and the handled amount was decreased from fiscal 2011. We will work for the further reduction of lead use.

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 2012	Increase or decrease from fiscal 2011
Major VOCs	Toluene	443	+38.0%
	Xylene	678	+7.1%
	Ethylbenzene	278	-14.7%
	Total	1,399	+9.3%
Dichloromethane		59	+31.1%
Hazardous heavy metals	Hexavalent chromium	23	-14.8%
	Lead	1.4	-17.6%
	Cadmium	0.013	-51.9%

*1 Amounts of major VOCs and dichloromethane are the amounts emitted, while that of hazardous heavy metals is the amount handled.
*2 Cadmium is not included in the collection of data under the PRTR Law because the amount handled is less than 500kg.

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 below 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

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, 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 respective products. 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*1, the RoHS Directive*2, and the REACH Regulation*3

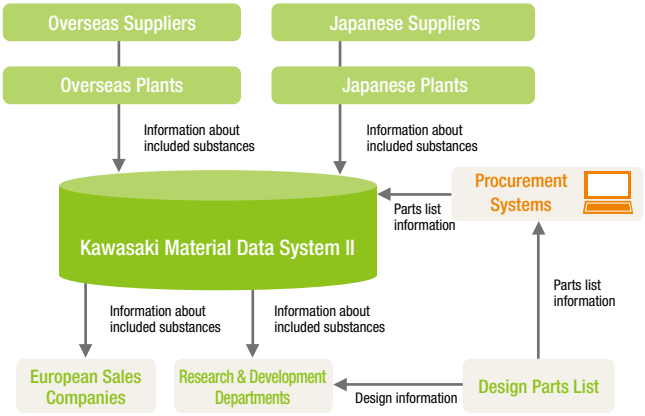
Since 2000, laws and regulations related to chemical substances have been strengthened in the European Union by the establishment of such controls as the ELV Directive, the RoHS Directive, and the REACH Regulation. The RoHS Directive covers electric and electronic products, and some of the products made 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. 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. KHI invited outside experts to lecture at corporate study sessions in Japan. Focusing on the REACH Regulation, they clarified issues and responses regarding chemical substance information management, which is required of companies operating abroad.

A cooperate study by an external lecturer for chemical substance information management

KHI practice “CSR procurement” (see p.25) 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*4 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
*4 Kawasaki Material Data System II: Currently we are preparing for the shift to International Material data System (IMDS)

Approach by the Motorcycle & Engine Company

Cleaner Exhaust Gas

In fiscal 2012, we continued to tackle technologies that make exhaust from motorcycles cleaner, from a world standard perspective, and launched sales of the Ninja ZX-14R, the newest in a flagship lineup that reigns supreme in every sport-bike domain. By improving intake and exhaust systems, we have ensured that this motorcycle meets European exhaust gas restrictions and delivers high environmental performance.

The fuel injection system features throttle bodies fitted with sub-throttle valves*1 and a remote idle speed control (ISC) valve*2 to provide fine fuel control perfectly matched to whatever driving conditions the rider encounters. As a result, this motorcycle offers outstanding engine performance without compromising efforts to meet tough exhaust gas standards.

*1 Sub-throttle valve: This electronically controlled device connects to the manual throttle and ensures optimum intake levels.

*2 Remote ISC (idle speed control) valve: This device controls fuel delivery not only under normal idling condition but also during deceleration.

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 2012, we achieved a recycling rate of 92.9%. From 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 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® watercraft, 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*3	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*4)
Hexavalent chromium	Use prohibited in and after January 2008
Cadmium	Use prohibited in and after January 2007

*3 Used batteries are already recycled and excluded from the target values

*4 Combination lamps, discharge headlamps, etc.

Environmentally Conscious Products -Transportation-Related Products-

In aerospace field, KHI Group contributes to the advancement of the world's aircraft by jointly developing and manufacturing with leading American and European enterprises. Our technologies are highly reputed in the world. Under the increasing demands for improvement of fuel efficiency, KHI Group has been developing the technologies for both aircraft bodies and engines. In shipbuilding field, KHI Group develops and builds 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, KHI Group manufactures a wide range of products, for example Shinkansen bullet trains. As for environmental measures, KHI Group emphasizes improved energy efficiency in rolling stock as well as noise reduction and enhanced recyclability, drawing on the results of technological teamwork with customers as well as our own technologies.

1 First Delivery of "Boeing 787 Dreamliner"

Low Fuel Consumption

Low noise

Right from the start, KHI was involved in the joint development of the "Boeing 787 Dreamliner" as a member of the international team, assigned with the task of developing the forward fuselage—a key component—and the fixed section of the wing trailing edge. With an innovative airframe using lightweight, high-strength carbon fiber composite for the fuselage and wings, this aircraft is about 20% more fuel efficient than comparable aircraft and cuts operating costs by about 30%. Greater use of composite materials, which boast excellent strength and anticorrosive qualities, facilitates better control of the on-board environment, including air pressure and humidity, which ensure a more comfortable flight for passengers. KHI also played a role in the development and production of the "Trent 1000 engine" for Rolls-Royce. This engine, which boasts low fuel consumption and low noise, powers the "787".

The first delivery of the 787 was to All Nippon Airways Co., Ltd.—the first customer (first order)- in September 2011, but the aircraft has captured the interest of airlines around the world and this is sure to make it a best seller.

The "Boeing 787 Dreamliner"

2 Development of New-Model LNG Carrier
—Inaugural Installation of Advanced Reheat Steam Turbine Plant Cuts Fuel Costs 15%

Low Fuel Consumption

The 177,000m^3-capacity KHI-built LNG carrier "Energy Horizon" expands 20% more tank capacity than its predecessors, thanks to the installation of the largest Moss* tanks ever fitted into an LNG carrier. Yet the carrier still maintains the ability to enter at the world's major LNG loading and receiving terminals. In addition to development work on hull size and shape, KHI endeavored to optimize propulsion performance, and while the ship is wider than existing carriers, it moves through the water with the same performance level.

Furthermore, the "Energy Horizon" is equipped with the world's first reheated steam turbine propulsion plant for LNG carrier, wherein steam used to drive the high-pressure turbine is returned to the boiler where it is reheated, with the resulting steam driving an intermediate-pressure turbine. This delivers a 15% improvement in fuel efficiency over conventional steam turbine propulsion plants and marks the first successful development of a new steam turbine plant for LNG carriers in about 35 years.

*The Moss independent, spherical tank design was developed by Norways' Moss Rosenberg (now, Moss Maritime).

The "Energy Horizon"

3 Production of New-Model Train "Series 13000"
—Takes Environmentally-Friendly, Barrier-Free Safety to New Heights

Energy conservation

Low noise

The "Series 13000" commuter train delivered to Keihan Electric Railway Co., Ltd., uses about 35% less electric power than the series it replaced, because of its semi-double skin aluminum body, which helps to reduce weight, and its variable-voltage, variable-frequency (VVVF) control which enables the power generated by the car during braking to be returned to the power supply system. The use of low-noise equipment also contributes to a quieter environment along the tracks.

In addition, these cars have more barrier-free features, including spaces for wheelchairs, LCD passenger information screens above doorways, measures for safe passage between cars, guidance chimes, door open/close indicator lamps, low-height luggage racks and bright orange lines marking the edges of the car doorways.

Structural strength was increased with the aim of further enhancing safety, including crash resistance, and measures were taken to prevent injuries to passengers in the event of emergency braking or collision.

The "Series 13000" commuter car for Keihan Electric Railway, Co., Ltd.

Environmentally Conscious Products -Industrial Plant and Equipment-

KHI Group is 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. KHI Group continues to develop new products with advanced technologies to meet these needs.

4 New" K7V Hydraulic Pump"—Shorter Overall Length, Reduced Weight

KHI develops and manufactures pumps as well as motors and a variety of valves for hydraulic shovels. The "K7V" is an environment-friendly hydraulic pump that reflects efforts to meet recent market demand for pumps that are more compact and deliver higher performance, through newly designed rotary components, including pistons and cylinders, which are core parts, and also reflects our commitment to make components more lightweight and to reduce the number of machining points. Compared with the "K3V", another Kawasaki-brand pump, the "K7V" is 13% shorter in overall length and an average 3 dB quieter. It boasts higher efficiency, up 1.5 points, and its bearing life is 68% longer for extended product life. In addition, the compact size led to a 7% reduction in the amount of materials used to build the "K7V". Consequently, the "K7V" contributes to lower environmental impact. We will continue to pursue improvements that limit environmental impact still further.


The " K7V Hydraulic Pump"

Resource saving

Energy conser-vation

5 Debut of "BX Series" Spot-Welding Robots

The "BX series" features vertical, articulated robots optimized for spot welding automobile bodies and components. This series takes the excellent performance of the "Z series" of existing, large, general-purpose robots, to the next level. With their lightweight arms, small, high-output, high-revolution motors and the latest in antivibration control technology, "BX series" robots achieve a cycle time about 25% faster than equivalent models already on the market. In addition, the arm features a hollow section to accommodate the cable harnesses of a welding gun, thereby obviating the need to allow for possible interference with adjacent robots or peripheral equipment. We also designed a compact body, which in conjunction with the in-arm harness housing feature, gives the "BX series" robots a footprint just half that of conventional models, and facilitates higher density installation.


"BX Series" Spot-Welding Robots

Resource saving

Energy conser-vation

6 Debut of "ESJ Model" Static Classifier-Equipped Opposed Jet Mill

KHI Group has a lineup of fluidized bed opposed jet mills with high grinding performance and easy-to-execute particle size adjustment. The new model augments the high grinding performance of its predecessors with a newly developed static classifier that works without the aid of any mechanical drive. Pressurized air is forced into the mill at the bottom in three directions at about 7 atm, causing particles to collide with each other inside these jets of air and thereby pulverizing the subject material. The mill structure is simple and the size is compact, facilitating disassembly, reassembly and maintenance. Also, the amount of compressed air used by this jet mill is roughly 20% less than that used by conventional jet mills with a classifier rotor.
The "ESJ Model" is ideal for use in the battery and pharmaceutical industries where processing small amounts of various types of materials requires frequent cleaning and washing of the equipment and for pulverizing materials that must be free of foreign particles and impurities. The Model is also ideal for R&D applications.


Jet Mill "ESJ Model"

EarthTechnica Co., Ltd.

Resource saving

Energy conser-vation

Environmental Solution Products -Energy-Related Products-

KHI Group has 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. KHI Group is also working on renewable energy technologies (solar cooling/heating system, bio-ethanol production, photovoltaic power generation, etc.) and clean energy technologies (hydrogen and LNG facilities, etc.)

1 Sales Begin for "L30A", a Japan-made 30 MW-Class High-Efficiency Gas Turbine

The "L30A" combines KHI's many years of expertise in developing small- and medium-sized industrial gas turbines with its highly sophisticated component technologies in the area of state-of-the-art jet engines and industrial gas turbines. With generating efficiency that exceeds 40%, this new gas turbine has the highest rating in the world in the industrial-use 30 MW class. A cogeneration system using this gas turbine is able to achieve total efficiency above 83%, and a combined-cycle generating plant that utilizes the gas turbine with a steam turbine realizes a power generation rate in excess of 50%. The new gas turbine is equally noteworthy for its environmental performance. Through a proprietary Dry Low Emission (DLE) combustion system, NOx emissions are held below 15 ppm—the lowest level in the world.

Demand for the "L30A" is sure to grow in Japan and worldwide, especially in light of rising interest in on-site power generation and tougher environmental standards.

Gas Turbine "L30A"

High efficiency energy utilization

NOx reduction below 15ppm

2 KHI Wins Order for Japan's First 110 MW Gas Engine Power Plant

KHI was sourced by Nihon Techno Co., Ltd., to construct a power plant for its Sodegaura Green Power Project. The plant, with 110 MW generating capacity, will comprise 14 units of the high-efficiency "Kawasaki Green Gas Engine" with unit capacity of 7,800 kW and power-generating efficiency of 49.0%. This will be the first gas engine power plant in Japan to have capacity exceeding 60 MW.

The "Kawasaki Green Gas Engine" provides superior environmental performance. It requires no additional denitrification devices in most areas of Japan since NOx emissions are below 200 ppm (O_2 = 0%), and it cuts fuel costs by more than 5% over conventional gas engines in the same class.

Demand for distributed power supply systems is expanding. In Japan, the technology is attracting interest as a way to deal with power shortages since the Great East Japan Earthquake, and overseas, it will provide power needed to support industrialization and economic development. To meet heightened expectations, KHI is working to reinforce its production structure for the "Green Gas Engine."

"Kawasaki Green Gas Engine"

High efficiency energy generation

High efficiency energy utilization

NOx reduction below 200ppm

3 Solar Absorption Chiller-Heater Optimized for Solar Thermal Energy Utilization

Technology for utilizing solar thermal energy is expected to become widely popular because it achieves annual energy transfer efficiency four times that of photovoltaic power generation. KHI Group offers a solar absorption chiller–heater optimized for solar thermal energy utilization. To promote greater interest in this unit, the Company installed a model plant at its Shiga Works. Test calculations indicate that the plant could realize energy savings of 14% over conventional equipment and cut CO_2 emissions by 18.3 tons per year.

The absorption chiller–heater uses water—not CFCs, HFCs or HCFCs—as the refrigerant and presents excellent environmental performance since it utilizes solar thermal energy and natural gas combustion for both cooling and heating applications.

In addition, the unit has been specially designed to maximize the potential afforded by solar thermal energy, with an emphasis on preferential use and control system of hot water heated by solar thermal energy.

Kawasaki Thermal Engineering

Solar Absorption Chiller-Heater

Renewable energy

Unutilized energy use

Environmental Solution Products -Waste Treatment and Environmental Pollution Prevention Products-

KHI Group 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. KHI Group has delivered leading-edge waste treatment systems all over Japan.
To prevent pollution, KHI Group has worked with a number of technologies to protect and improve air and water quality. KHI Group has 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 Cement Plant Waste Heat Recovery Power Generation Contributes to Lower CO_2 Emissions

A cement plant waste heat recovery power generation is a facility that generates power by recovering heat from the waste gas discharged during production of cement and therefore exemplifies clean power generation technology that does not release CO_2. The power that is generated is sufficient to cover about 30% of a cement plant's overall power consumption. KHI has earned a solid reputation for reliability, underpinned by expertise in waste heat boilers, which can tolerate high-temperature gas above 1,000ºC and exhaust gas containing large amounts of dust. Since delivering its first waste heat power generation facility for a cement plant in 1980, the Company has built more than 180 systems for cement plants in Japan and overseas. Some of these projects are still under construction. Many orders 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 exceeds 2,100 MW, which has contributed to a reduction of more than 14 million tons of CO_2 emissions per year.

Cement plant waste heat recovery power generation

Waste heat utilization

5 KHI Wins Order to Build and Maintain Municipal Waste Incineration Plant

KHI was selected by the city of Miyakonojo in Miyazaki Prefecture to build and maintain the city's Clean Center. This design-build-maintain project bundles construction of a waste incineration plant and its maintenance over a 20-year period. The facility will be able to incinerate 230 tons of waste per day, and it will have a reduced impact on the environment thanks to an all-out effort to minimize air pollution. Specifically, the facility will be equipped with parallel flow stoker-type incinerators capable of high-temperature combustion at a low excess air ratio, and flue gas exiting the furnace will go through filter-type dust collectors, selective catalytic reduction system and exhaust gas recirculation system. The facility will achieve superior environmental and energy-saving performance, with maximum power generation capacity of 4,990 kW and power generation efficiency of about 20% during normal waste-burning operation.

Waste Incineration Plant

High efficiency power generation from waste products

CO_2 Emissions Reduction through Products for Major Products Delivered in Fiscal 2012

Field	CO_2 Emissions Reduction	Major Products	Technologies, Remarks
Energy-related products	215,000t-CO_2/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	102,000t-CO_2/year	• 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
		• intermediate-pressure compressor for the "Trent" engine	4
Industrial equipment and other products	4,000t-CO_2/year	• Sewage aeration blowers ("Kawasaki MAG Turbo series")	5
		• Electro-hydraulic hybrid system ("Kawasaki Eco Servo")	5
		• Large General-purpose Robot	5
Total	312,000t-CO_2/year	–	–

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_2 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_2 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_2 reduction effect.