



Environmental Report

2003

Contents

Corporate Profile	2
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Message from the President	3
----------------------------	---

Introduction of Environmental Efforts by Kawasaki Internal Companies and Affiliates

Rolling Stock, Construction Machinery & Crushing Plant/Aerospace/ Gas Turbines & Machinery/Plant & Infrastructure Engineering/ Consumer Products & Machinery/Kawasaki Shipbuilding	4
--	---

Summary and Evaluation of Basic Plan and Key Measures

Summary of 3rd (FY2000-FY2002) Environmental Protection Activities Plan (EPAP) and FY2002 Environmental Protection Activities Key Measures	5
--	---

Voluntary Evaluation of Kawasaki's Environmental Level Evaluation of Kawasaki's Environmental Management Level by the Rating Institute	6
---	---

Medium- and Long-Term Environmental Vision

What Kawasaki Should Be in the Year 2010	7
Environmental Charter/Message from the Chief Environmental Officer	8

Environmental Management

Organization for Environmental Management/4th (FY2003-FY2005) Environmental Management Activities Plan and FY2003 Key Measures	9
Environmental Management System	10

Environmentally Conscious Products

Product Assessment/LCA (Life Cycle Assessment)/Green Procurement	11
Representative Products for Environmental Impact Reduction	12
Environmentally Conscious Products	13
Environmental Protection Products	15

Feature Report—Environmental Business

Recycle Power Generation Technology	17
-------------------------------------	----

Environmentally Conscious Production

Energy Saving/Prevention of Global Warming	19
Waste Reduction/Chemical Substance Reduction	20

Environmental Communication

Environmental Accounting	21
Volunteer Activities & Contributions to Local Communities/ Information Disclosure	22

Environmental Data

Internal Companies/Affiliates	23
Production Base	25

Editorial Policy

- This report summarizes the achievements and evaluation results for FY2002, which is the final year of our 3rd Environmental Protection Activities Plan (EPAP).
- This report briefly describes our Medium- and Long-Term Environmental Vision, which defines what Kawasaki wants to be in the year 2010. The report also presents our 4th Environmental Management Activities Plan (EMAP), which specifically describes the steps we will take to realize our Environmental Vision. This information indicates that our environmentally conscious efforts are shifting from environmental protection activities to environmental management activities for sustainability.
- As the internal company system has been firmly established, this report introduces the commitment of each company president to environmental management.
- The ways that our products contribute to society in terms of environmental protection is presented with concrete examples of both improved product performance (energy saving, light-weight design, etc.) and environmental protection technology development.
- In addition to company-specific data, this report discloses the environmental impact data by production base.

We hope this report will help you understand our position on the environment as well as make clear the environmental protection activities that we are implementing as part of our Environmental Management for Sustainability concept.

About This Report

● Reporting Scope

This report covers information on environmental aspects of head offices, technical institutes, branch offices, and works of Kawasaki in Japan. Affiliates include Kawasaki Shipbuilding and Kawasaki Precision Machinery (KPM) but do not cover overseas offices.

● Reporting Period

The information contained herein is reported for the period of April 1, 2002 to March 31, 2003, which is our FY2002.

● Schedule for Future Issues

This report will be issued annually.

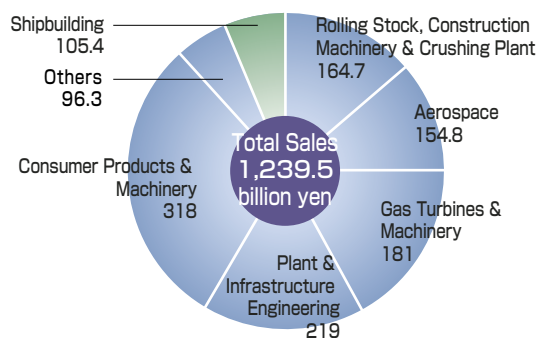
Corporate Profile

- ◎Name: Kawasaki Heavy Industries, Ltd.
- ◎Incorporated: October 15, 1896 (Founded: April, 1878)
- ◎Capital: 81.4 billion yen
- ◎Location of Head Offices: Kobe Head Office: 1-3, Higashikawasaki-cho 1-chome, Chuo-ku, Kobe, Hyogo 650-8680, Japan
Tokyo Head Office: 4-1, Hamamatsu-cho 2-chome, Minato-ku, Tokyo 105-6116, Japan
- ◎Representative: Masamoto Tazaki, President and CEO
- ◎Kawasaki Network: Domestic Offices 26 (including 13 Works) Overseas Offices 7 Subsidiaries and affiliates 134 (As of March 31, 2003)

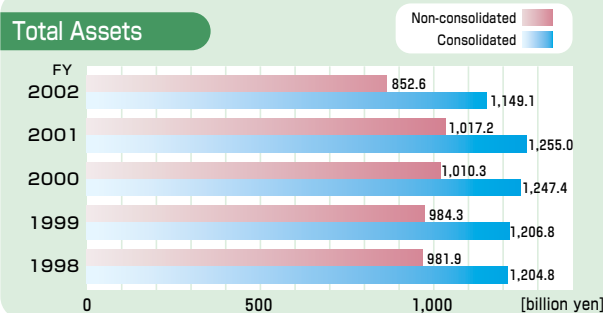
Business Fields, Major Products and Domestic Works

Business Fields	Rolling Stock, Construction Machinery & Crushing Plant	Aerospace	Gas Turbines & Machinery
Major Products	Rolling Stock, Construction Machinery, Crushing Plants, Grinding Plants, Cast Steel Products 	Aircraft, Space Development Equipment 	Gas Turbines, Jet Engines, Prime Movers, Equipment 
Works	Hyogo Works/Banshu Works/Yachiyo Works	Gifu Works/Nagoya Works 1/Nagoya Works 2	Akashi Works/Seishin Works/Kobe Works/Nishi-Kobe Works
Business Fields	Plant & Infrastructure Engineering	Consumer Products & Machinery	Shipbuilding
Major Products	Industrial Plants, Environmental Protection Facilities, Steel Structures 	Motorcycles, ATVs, Jet Ski Watercraft, Industrial Robots 	Shipbuilding, Marine Engineering 
Works	Noda Works/Kobe Works/Harima Works	Akashi Works	Kobe Works/Sakaide Works

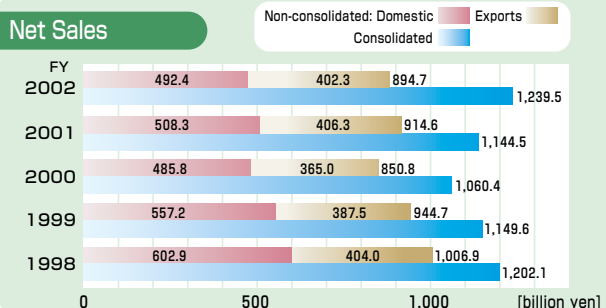
Sales by Segment (FY2002)



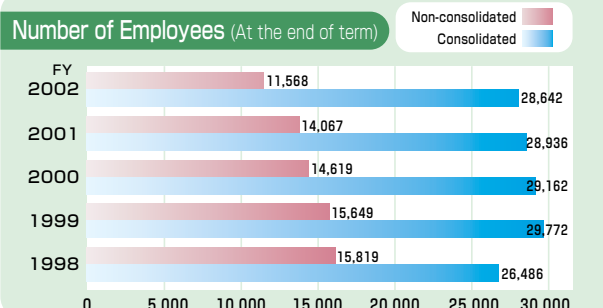
Total Assets



Net Sales



Number of Employees (At the end of term)



The Key to Realizing Sustainable Society Lies in the Pursuit of Technology

Environmental Management for Sustainability that leads to a Quality followed by Quantity Philosophy



Masamoto Tazaki
President and CEO

A handwritten signature of Masamoto Tazaki in black ink, written in a cursive style.

The key concepts of our philosophy are "Technology that returns Materials to Nature" and "Technology that utilizes the Blessings of Nature."

As the global environment has continued deteriorating, people are increasingly doubtful about societies that use a lot of resources and energy. To maintain a pollution-free society, the life style of the past, say, a few centuries ago, may be an ideal choice. However, even though some people feel happy even if they do not have many material goods, some people want to enjoy the abundance of the modern age. I believe it is a duty of a manufacturing corporation to cope with the diversity of people's senses of value with minimum amounts of resources.

First, it is vital not only to make products from resources but also to recover unnecessary resources and return them to nature. Kawasaki is manufacturing return-flow oriented products such as waste treatment and sewage sludge treatment plants. In this context, one important point is how to share recycling costs. This is because in return-flow industries, unlike in forward-flow industries, cost recovery based on the superficial product value is difficult. Everyone must recognize that waste disposal has a cost. I think corporations must pursue production practices that consider the whole lifecycle, ranging from manufacture, construction, and use to decommissioning and final disposal.

Now, obtaining energy is another problem, because energy must be used for recycling, too. Developing a new energy source that can be substituted for rapidly decreasing fossil fuel resources is an urgent task.

One very promising energy source is solar energy. Petroleum and wind power are both fundamentally derived from solar energy. The key to solving our environmental problems appears to be the effective utilization of this practically inexhaustible

natural energy supply. Kawasaki has been committed to promoting technological developments in wind power generation, biomass, solar energy systems, etc. In addition to the creation of new technologies, we are also greatly reducing CO₂ emissions from conventional products such as railway rolling stocks and marine vessels by making efforts to reduce their weight and improve their fuel consuming efficiency.

Kawasaki is based in Japan where resources are not abundant. Therefore, Japanese industries should lead the world with technology that is based on the blessings of nature. We, Kawasaki, want to focus our overall technological assets on this goal.

Quality and Environment are an Inseparable Combination.

Environment and business growth sometimes conflict with each other. What can make these factors compatible with each other is technology. Our Medium- and Long-Term Environmental Vision, adopted in the current fiscal year, presents numerical targets that we can attain with technological efforts. As for monetary profit, we have defined our views on this in a guide, Environmental Management for Sustainability.

Stricter environment-related regulations are being imposed increasingly throughout the world. Without a doubt, a corporate culture that strives to comply with existing laws and regulations is very important. Anticipation of the possibility (risk) of being subject to new regulations in the future is also necessary. At Kawasaki, we are adding the factor E (Environment) to the factors Q (Quality), C (Cost) and D (Delivery), which we already consider.

Though this may appear to be a higher hurdle, I believe it is vital to address environmental issues with the attitude that "quality and environment are an inseparable combination" in mind. This stance coincides with the policy I have continued to promote since my promotion to the presidency that "high value-added products and services differentiated by technology and brand power are more important than quantitative expansion" and with my "Quality followed by Quantity Management" principle.

Technical Innovation makes Dreams Come True.

The driver of the vehicle "Earth" has been attempting to evade various obstacles by steering alone while pressing down the accelerator pedal (with mass-production and mass-consumption). However, the driver has just noticed that the brake (the environment) plays a vital role in safe driving. I firmly believe that what we can do to allow people to share the blessings of nature and create an affluent and well-balanced society is to make innovations in energy-related technology. I believe we must maintain our spirit of taking on challenges and the attitude that we will make it possible with Kawasaki technology. I strongly hope that all Kawasaki employees are following the "Think Globally, Act Locally" philosophy, and promoting sustainable safe driving for the vehicle "Earth" while contributing to keeping the planet beautiful into the future.



Introduction of Environmental Efforts by Kawasaki Internal Companies and Affiliates

Rolling Stock, Construction Machinery & Crushing Plant Company

Reducing Lifecycle Energy Use and Promoting Environmental Management for Sustainability

Our company is involved in society's infrastructure projects with our products being used in every phase. For example, our construction machinery is used in the construction phase, our rolling stocks are used in the operation phase, and our crushers and pulverizers are used in the recycling phase.

Therefore, to reduce the environmental impact, we must reduce the lifecycle energy use for every piece of infrastructure equipment.

One example is that the lifetime energy consumption of Shinkansen 700 series trains is as low as approximately 2/3 of those of the first generation Shinkansen trains (report from the user). The percentage of our construction machinery subjected to product assessment has reached 75%. Now, as a result, as much as 95% of our construction machinery uses low-emission engines. Furthermore, we are developing equipment that uses refuse plastic (RPF) derived from recovered infrastructure project materials.

Through the products that reduce the lifecycle energy use of infrastructure, we have become further committed to establishing environmental management for sustainability and to creating a sustainable society.



Tadaharu Ohashi
President

Aerospace Company

In Pursuit of the Realization of Environmental Protection and Environmental Management for Sustainability

The Aerospace Company is in its second year since the acquisition of ISO 14001 certification. We still have many challenges ahead of us. The most critical challenge is the establishment of an environmental protection program that covers local communities.

Since our Gifu Works is situated in an urban area and there are sources of drinking water in ground water and downstream from the works, we are extremely careful about maintaining and controlling air and water quality. In this situation, we are continuously making efforts for environmental protection including substitution of harmful substances with safe alternatives.

Next, in the area of product development, we will attempt to implement product assessment in a three-year plan. So far, we have been studying the application of the LCA technique. In this fiscal year, we are going to start fully working group activities and begin trials of the LCA technique.

All of our employees are determined to make further efforts focused on the implementation of environmental protection and environmental management for sustainability.



Takashi Sugoh
President

Gas Turbines & Machinery Company

Contributing to Society with Quality- and Environment-Conscious Products

In recent years, society has increasingly concerned about environmental impact caused by business activities, and legislative regulations such as Global Warming Prevention programs are imposed.

Our company provides wide scope of environmentally conscious products with recognition; e.g. compact gas turbine engines with high power output, co-generation systems of exceedingly high comprehensive energy efficiency, and tunnel ventilation systems. In order to improve our management and operations, we have established the environmental mission statement: "Realizing the environmentally conscious producing process and products". Accordingly, we have been committed to improving production process for reducing disposal, implementing "Zero Emission Activities", and application of product life cycle assessment method.

Our goal is contribution to customers, communities and other stakeholders through establishment of environmental prevention management. To accelerate our managerial activities and contribute to realizing a sustainable society, we will make efforts to implement maximizing resource efficiency and developing quality and environmentally conscious products.



Takashi Yoshino
President

Plant & Infrastructure Engineering Company

Our Technology Responds to the Need for Reduction in Environmental Impacts

In every aspect, our company is deeply committed to the protection of the global environment.

Our Environmental Control Plant Division designs and fabricates equipment and systems necessary for environmental protection, such as refuse incinerators, industrial wastes recycling equipment and sewage water treatment equipment. The major products of our Power Plant & Industrial Plant Engineering Division include waste heat recovery boilers, which transform the thermal energy released from production processes of paper making, steel making and cement manufacturing into steam and/or electric power. We also make desulfurization and denitrification equipment, which inhibit emissions of SOx and NOx derived from thermal power stations, and cement manufacturing plants that are optimized for energy saving.

Furthermore, our Steel Structure & Industrial Equipment Division manufactures wind turbine generation plants and facilities associated with LNG, which is one of the cleaner energy sources. We are going to further develop and improve these products as well as promote energy saving with all our products, assisting in protection of the global environment.



Takuya Maeda
President

Consumer Products & Machinery Company

The Most Important Task is to Develop Products that are Friendly to the Earth

Our company provides leisure products including motorcycles and four-wheeled buggies (ATVs). These products improve the lives of their users, but they also have impacts onto the global environment. To alleviate these impacts, we have been mobilizing all our technologies to reduce fuel consumption, make exhaust gas cleaner, and minimize discharge of other substances with environmental impact. We are also continuously working to improve our recycling systems.

For our personal watercrafts we introduced models with 4-stroke engines, which allowed us to improve greatly the cleanness of exhaust gas and suppress noise emissions. For motorcycles, we are developing a clean engine that can meet the 3rd exhaust gas regulation used in Europe (EURO III). Steady implementation of ISO 14001 activities is one of our key efforts toward alleviating the environmental impact of our production activities. Another critical task for the business management of our company is the manufacture of products that are friendly to the global environment, such as those mentioned above.



Shinichi Morita
President

Kawasaki Shipbuilding Corporation

Further Promoting Environmental Management Activities for Sustainability

Proud of having been a key division in the Kawasaki Group, after becoming an independent company last October, we have continued executing our task of shipbuilding for the realization of a sustainable society.

We focus on the construction of LNG ships and LPG ships that transport clean energy. Our Sakaide Works will start constructions of the world's largest LNG ship, and an LPG ship that incorporates an innovative energy-saving hull design.

We will continue to make every effort to proceed with an environmentally conscious shipbuilding process while conserving resources and reducing energy consumption. In FY2001, our Kobe Works acquired ISO 14001 certification. We are now going to proceed steadily with the continued improvement of an Environmental Management System (EMS) in all of our divisions and at all phases of production. At the same time, we will request that our employees continue to be conscious about environmental protection in their homes and local communities, while we promote environmentally conscious management with an increased emphasis on the global environment.



Suichi Tadokoro
President

Summary and Evaluation of Basic Plan and Key Measures

Summary of 3rd (FY2000-FY2002) Environmental Protection Activities Plan (EPAP) and FY2002 Environmental Protection Activities Key Measures

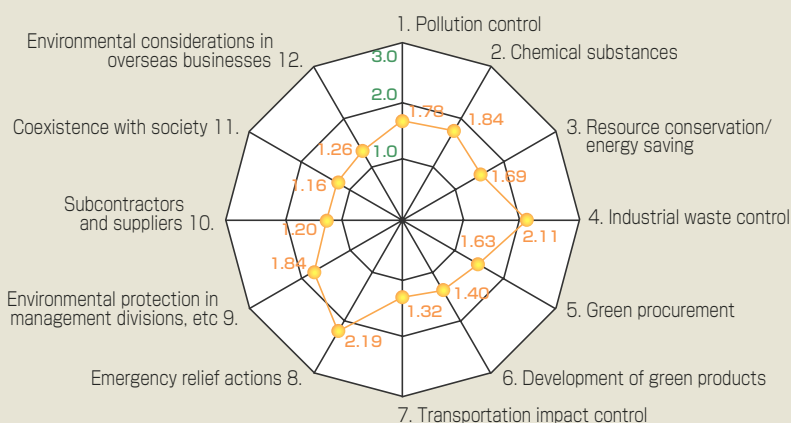
At the closing of the final year of our 3rd EPAP, we have investigated the achievements of the three-year EPAP and key measures of FY2002 in preparation for designing our 4th Environmental Management Activities Plan (EMAP) that begins in FY2003.

※Evaluation criteria: ○...Target was almost fully achieved. △...Target was not achieved despite positive efforts. ×...More efforts are needed.

Item	3rd EPAP (Target)	Achievements of Activities	Evaluation Result	FY2002 Environmental Protection Activities Key Measures	Achievements of Activities	Evaluation Result
Environmental Management	Environmental protection activities · Development of an Environmental Management System (EMS) in non-works offices and technical institutes	· Acquisition of ISO 14001 certification in all business divisions · Maintenance of EMS in the Tokyo Head Office, the Kobe Head Office, technical institutes, etc.	○	· Establishment of EMS in the office activities · Promotion and establishment of EMS in consolidated subsidiaries	· EMS has been established. · Nagoya Office acquired Eco-office recognition from Nagoya City. · ISO 14001 seminars were given to consolidated subsidiaries.	○
Production Activities	Prevention of pollution · Compliance with environmental laws and regulations, and prompt conformity with stricter laws and regulations	· One administrative provision, five administrative warnings and six resident complaints · Conformity with the PRTR Law, the PCB Control Law, and Dioxin Pollution Control Law	△	· No administrative penalty, administrative provision or administrative warning · Conformity with new environmental laws and regulations achieved early	· No administrative penalty, one administrative provision, three administrative warnings · Two resident complaints · Establishment of conformity with the PRTR Law and the PCB Control Law	△
Environmental Impact in Production	Energy saving · Determination of greenhouse gas emissions · Development of the Greenhouse Gas Reduction Plan	· Determination of greenhouse gas emissions other than CO ₂ emissions · Setup of corporate-wide numerical targets for the Greenhouse Gas Reduction Plan	△	· Creation of action plan for the Greenhouse Gas Reduction Plan · Study of third party evaluation methods for greenhouse gas emissions	· Setup of corporate-wide numerical targets · Third party evaluation methods are still under study in Japan, and will be considered as necessary.	△
Reduction of Environmental Impact	Resource conservation and recycling · Reduction of waste and promotion of recycling · Promotion of a zero waste disposal works	· Amount of waste was decreased from 71,920 t to 66,960 t (decrease of 6.9%) · Recycling rate was increased from 64.7% to 84.6%. · Zero waste disposal was achieved in four works.	○	· Kobe Head Office achieved zero waste disposal in FY2002, and Kobe (Machinery Division), Hyogo and Akashi Works will attain zero waste disposal in December 2003.	· Hyogo Works achieved zero waste disposal in November 2002 (1 year ahead of schedule) and Kobe Head Office by the end of FY2002.	○
Environmentally Conscious Product Manufacturing	LCA technique · Establishment of initial inspection technique for conventional products · Study for introduction of LCA technique	· Provision of product assessment regulations for environmental friendliness of products · Introduction of LCA technique, and trial was run for a specific model machine.	○	· Provision of product assessment regulations, and promotion of implementation of product assessments · Review of applicability of LCA	· Promoted the assessment regulations at 10 out of 13 works. · Reported LCA application cases at the Japan Waste Management Experts.	○
Environmentally Conscious Product Manufacturing	Green procurement · Promotion of selection and procurement of goods, parts and materials that have less environmental impacts	· In 1999, corporate-wide policy was set up. Green purchasing of stationery has been promoted (step 1). · Green procurement for products is to be performed (step 2).	○ △	· Implementation of green procurement of products and production policy to applicable items	· Green purchasing has been expanded (step 1). · Questionnaires about green procurement to subcontractors were given. · Introduction of lead-free paint was implemented (step 2).	○ △
Activity Evaluation	Environmental performance evaluation · Execution and promotion of environmental performance evaluation	· Trial use of the Evaluation Guide from the Japan Machinery Federation · Development of Kawasaki's Evaluation Guide	○	· Make and execution of Kawasaki's Environmental Activities Evaluation Guide · Collection of environmental data according to the Guidelines from the Ministry of the Environment	· Issued the Kawasaki's Environmental Activities Evaluation Guide and evaluated FY2002 activities. · Collected environmental data according to the Guidelines.	○
Information Disclosure	Environmental Report (ER) · Preparation for development and issuance of site-specific ER	· Disclosure of site-specific environmental data in corporate-wide ER, in place of site-specific ER	○	· Enrichment of environmental data disclosed according to the Guidelines of the Ministry · Issuance of site-specific ER	· Description of environmental data in ER according to the Guidelines · Site-specific ER is superseded by inclusion of site-specific environmental data in corporate-wide ER.	○
Environmental Accounting	Environmental accounting (EA) · Introduction of EA system that evaluates expenses invested in environmental protection activities	· Development of Kawasaki's EA Guidelines based on the Guidebook from the Ministry of the Environment, and execution of calculations for EA	○	· Introduction of Kawasaki's EA Guidelines, and execution for FY2001 on a trial basis · Report the FY2002 data on this ER 2003.	· Calculated FY2001 data on a trial basis. · Calculated corporate-wide data for FY2002 according to Kawasaki's EA Guidelines.	○

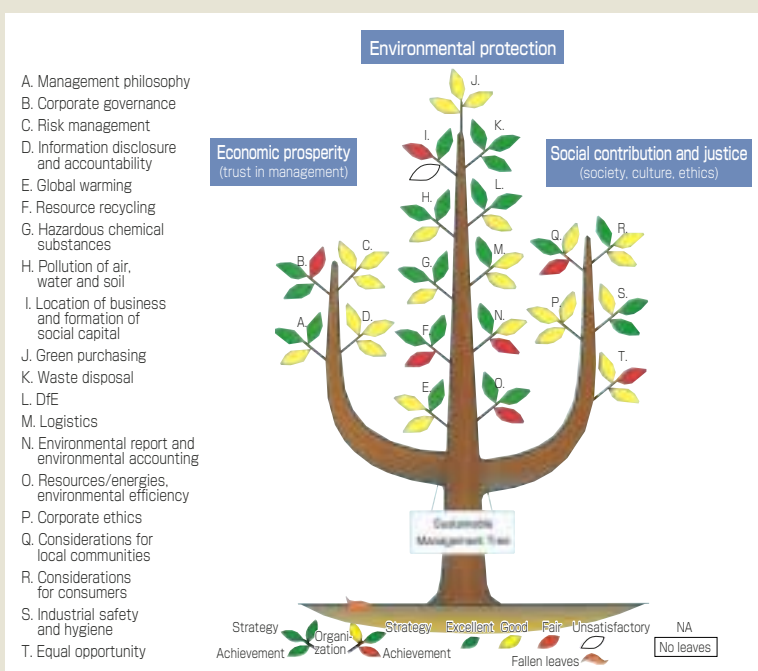
Voluntary Evaluation of Kawasaki's Environmental Level

- Each division performed a self-evaluation using Kawasaki's Environmental Activities Evaluation Guide, which comprises a check sheet containing 12 indexes and 37 questions. The results were calculated to corporate-wide averages.
- The results are shown in the form of a radar chart given below, where a full mark for each index is 3.0. The marks for the ratings "Development of green products", "Transportation impact control", "Subcontractors and suppliers", "Coexistence with society", and "Environmental considerations in overseas businesses", show that more efforts are needed in these areas.



Evaluation of Kawasaki's Environmental Management Level by the Rating Institute

- In order to get an evaluation by a third party, we received an environmental management level rating in FY2002 by Rating Institute for Sustainable Management.
- Environmental management level rating is a method to evaluate the environmental efforts of a corporation by means of 20 indexes and 60 questions that are arranged on three branches of a tree— "Economic prosperity", "Environmental protection" and "Social contribution and justice".
- After the questions were answered, a discussion session was held by the evaluating members, and based on the results, the tree diagram below was drawn. The diagram contains many yellow and red leaves, which indicates that more improvement is needed.



Targets to Be Fulfilled

• Promote EMS to consolidated subsidiaries of Kawasaki Heavy Industries as a group.

• Have no occurrences of administrative penalty or complaints from local communities.
• Comply with laws and regulations and improve voluntary control standards that meet the needs of society.

• Develop and implement action plans to achieve target values for reducing greenhouse gases.

• Realize zero waste disposal in all works by the end of FY2004.

• Expand application of Design for Environment (DfE) by product assessment, LCA, etc.

• Green procurement for products and production needs to seek systematic practices.

• Continue implementation of Environmental Activities Evaluation Guide, which is one of self-evaluation methods.
• Establish numerical indexes for analyzing environmental performance.

• More comprehensive site information in ER
• Inclusion of environmental data of consolidated subsidiaries in ER

• Study various EA techniques that serve internal management.
• Achieve more quantitative accounting for effective investment.

Seeking to Establish Environmental Management for Sustainability and Enhance Corporate Value

The first 3-year Environmental Protection Activities Plan (EPAP) began in FY1994. FY2002 was the final year of the 3rd EPAP (FY2000-FY2002), and FY2003 marks the start of another. At this point, we have developed our Medium- and Long-Term Environmental Vision that illustrates in the future Kawasaki wants to contribute actively to the realization of a sustainable society. The Medium- and Long-Term Environmental Vision describes what Kawasaki should be in the year 2010 considering five facets—Environmental Philosophy, Environmental Management, Environmentally Conscious Products, Environmentally Conscious Production, and Environmental Communication. The expression used previously, "Environmental Protection Activities" has been superseded by the expression "Environmental Management Activities for Sustainability" in the new Vision. Thus, we are vigorously going to promote environmental management for sustainability that puts a priority on the environment.

In the 4th (FY2003-FY2005) Environmental Management Activities Plan (EMAP), we have set up specific numerical targets whenever possible and we will take all possible measures to satisfy these targets.

What Kawasaki Should Be in the Year 2010

Environmental Philosophy

- Actions by all Kawasaki Group employees are taken with concern for the environment, not only at work, but also in their local communities and homes, in accord with our Environmental Philosophy, which declares our commitments to the realization of a sustainable society.

Environmental Management

- Implementation of an Environmental Management System (EMS) and action are taken based on this EMS by all Kawasaki Group employees.
- Incorporation of environmental considerations into the business management of each internal company enhances their environmental management levels.
- An environmental management information system is created.

Environmentally Conscious Products

- Design for Environment (DfE) is used for all products to enhance their environmental efficiency.
- Products are offered that help protect the environment, thus contributing to the environment, society and businesses.

Environmentally Conscious Production

- Administrative penalties and administrative provisions are avoided, and voluntary control standards based on the needs of society are established to improve our environmental management level.
- Every production activity is free of irrationality and waste to enhance the efficient utilization of resources and energies.
- Total greenhouse gas emissions amount in FY2010 is reduced by 6% relative to the FY1990 level.
- Total waste production in FY2010 is reduced by 10% relative to the FY2000 level.
- Maintenance of zero waste disposal (recycling rate 100%) is realized in all works.
- The use of harmful chemical substances is reduced.

Environmental Communication

- Kawasaki Environmental Reports that comply with the needs of society are published.
- Communication with stakeholders is promoted.
- The entire corporation and all employees are committed to environmental improvement in local communities.

Development into 3-year Environmental Management Activities Plan

Continuous Improvement of Corporate Value

Establishment of Environmental Management for Sustainability

Environmental Charter

Environmental Philosophy

As a company in key industries related to land, sea and air, Kawasaki is deploying its business activities globally in pursuit of reducing environmental impact and creating a sustainable society. This makes us to commit ourselves to contribute to the sustainable development of society through our environmentally conscious business activities, technologies and products that preserve the global environment.

Conduct Guidelines

1. Recognizing that global environmental protection is a common and serious issue for humankind, Kawasaki 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, Kawasaki will endeavor to conserve resources, to save energy, to recycle resources and to reduce industrial waste and will promote the reduction of environmental impacts.
3. In the new product planning (i.e. research and development) and designing stages, Kawasaki will render careful attention throughout the procurement, production, distribution, utilization and material disposal stages in order to minimize the environmental impacts.
4. In seeking solutions to global environmental issues, Kawasaki will do its best to develop and provide new technologies and new products that contribute to environmental protection, energy saving and resource conservation.
5. Notwithstanding its compliance with environmentally related institutional laws, regulations and agreements and voluntary action plans of each industry concerned, Kawasaki will voluntarily institute its own environmental control standards as an appropriate and necessary action in order to strive to improve environmental control levels.
6. Through environmental training and public awareness activities, Kawasaki 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.
7. Kawasaki will implement an environmental management system to promote environmental preservation and conservation, and hold regular conferences to review management systems and maintain continual improvement.

Message from the Chief Environmental Officer



Shiroh Ikeda

Chief Environmental Officer
Senior Executive Officer

We Want to Be a Corporation with Higher Social Value by Establishing Environmental Management for Sustainability.

The three years of activities of the 3rd EPAP, which began in FY2000, ended in FY2002. During this period, all of our works acquired ISO 14001 certification, our office divisions established Environmental Management System (EMS), thus a corporate-wide EMS has been established. Through efforts for energy saving and resource conservation, four works achieved zero waste disposal, thus we are steadily approaching our target of zero waste disposal for all Kawasaki works.

In our 4th Environmental Management Activities Plan (EMAP), which will last 3 years beginning in FY2003, we have clearly defined our Medium- and Long-Term Environmental Vision that describes what Kawasaki should be in the year 2010, and designed an action plan for realizing this vision. Because environmental protection activities became a common practice in Kawasaki through our efforts up to the 3rd EPAP, the emphasis in the 4th EMAP is placed on environmental management rather than environmental protection. We are more clearly stating that an environmentally conscious attitude is a vital component in business management. The most important thing in this EMAP is that "Actions by all Kawasaki Group employees are taken with

concern for the environment, not only at work, but also in their local communities and homes" as stipulated in the environmental philosophy given in this EMAP. In other words, business management and environmental protection must be unified into one concept.

Moreover, the 4th EMAP sets up goals with a quantifiable values. To be able to fulfill the targets, an environmental management officer is assigned to each internal company to promote environmental management activities.

We intend to establish a system to improve the environmental management level of our internal companies in which the environmental management officer of each company determines a marker for evaluating the environmental efficiency of a product or production activity that is suitable to the business structure of the division.

Recently, environmental regulations have become stricter as new environment-related laws have been enacted. As a matter of course, most corporations strictly abide by these laws and regulations. However, merely complying with laws and regulations will not be sufficient. Each corporation must introduce measures to cope with every conceivable risk that might possibly occur in the future. Our EMS not only clearly states the requirements that each works must satisfy, but also encourages strengthening and enhancement of voluntary risk management.

Every Kawasaki employee involved in manufacturing should, at every stage of production, think about implementing an arrangement friendly to the earth, which would thus contribute to both the corporation and society. Each works should also contribute to society through its unique know-how and expertise, for example by sponsoring an environmental education session in a local community or maintaining communication with those concerned about a company-related issue.

We will continue to disclose information through Environmental Reports and on our web pages so that our attitudes and stance on environmental management activities are made widely known to the public.

Environmental Management

Since we have been aiming at the corporate-wide application of environmental protection activities, all our works have acquired ISO 14001 certification. An environmental control framework is also taking root in our office divisions. Now, we are going to promote the environmental management level in the whole group, as well as encourage the creation of environmental control frameworks in our affiliates.

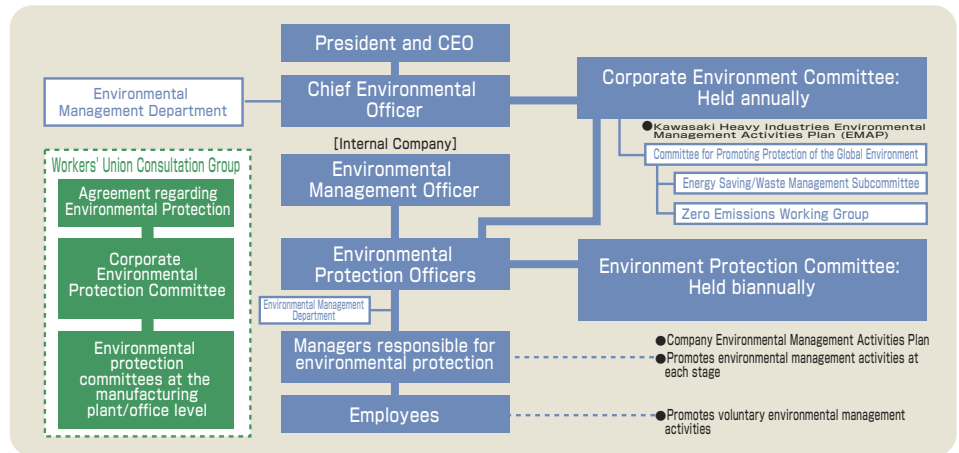
Organization for Environmental Management

Our 4th (FY2003-FY2005) Environmental Management Activities Plan (EMAP) defines the promotion of environmental management for sustainability in the internal company system as well as the commitment of the Kawasaki Group to the environment. In this plan, the organization for promoting environmental management for sustainability after the establishment of Kawasaki Shipbuilding and Kawasaki Precision Machinery (KPM) as independent companies will appear as illustrated on the right.

The major differences from the organization in FY2002 are as follows:

- In each internal company or technology development department, an environmental management officer was appointed.
- Also, in the affiliate company group in the head office that guides the affiliates, environmental management officer was appointed.

[Environmental Management System]



4th (FY2003-FY2005) Environmental Management Activities Plan and FY2003 Key Measures

Item	4th (FY2003-FY2005) Environmental Management Activities Plan	FY2003 Key Measures
Environmental Philosophy	<ul style="list-style-type: none"> • Enhancement of environmental activities to promote environmental consciousness ① Environmental Handbook for Kawasaki Group will be published in FY2004. ② Information technology will be utilized. ③ Education activities will be continued and information will be upgraded. 	<ul style="list-style-type: none"> • Preparation of draft of Environmental Handbook • Planning of environmental education utilizing information technology • Continued reporting of environment-related topics and deepening of information
Environmental Management	<ul style="list-style-type: none"> • Establishment of EMS with major subsidiaries in Japan • Establishment of a technique for analyzing activities of internal companies • Periodic publication of environmental information associated with business management • Realization of online environmental data collection through intranet 	<ul style="list-style-type: none"> • Planning of EMS establishment for consolidated subsidiaries • Investigation into indexes for analyzing environmental management activities • Periodic publication of Environmental Management Information • Investigation into online environmental data collection
Environmentally Conscious Products	<ul style="list-style-type: none"> • Application of Design for Environment (DfE) (product assessment, LCA, etc.) for major products • Promotion of green procurement by acquiring data from sources of procurement • Enhancement of supply of products that promote environmental protection and reduce environmental impact 	<ul style="list-style-type: none"> • Application of DfE for major products • Development of database from supplier survey report about environmental management status, and application of rules about green procurement • Achievements in green procurement of office items • Study trends in environment-related laws and regulations and social needs to be able to expand the scope of products that contribute to environmental protection
Environmentally Conscious Production	<ul style="list-style-type: none"> • No administrative penalty, administrative provision, resident complaint, etc. • Setup of voluntary control standards that addresses social needs • Determination of energy and material flows for each major process • Reduction in total emissions of greenhouse gases to FY1990 level (reduction of 9,500 t of CO₂) • Reduction in total waste production by 5% relative to the FY2000 level (reduction of 3,500 t) • Realization of zero waste disposal in all works by the end of FY2004 • Implementation of hazardous chemical substances reduction program 	<ul style="list-style-type: none"> • No administrative penalty/provision, resident complaint, etc. • Research into possible voluntary control standards • Development of program for acquisition of energy and material flows for major processes • Reduction in emissions of greenhouse gases by 1% relative to FY2002 level • Reduction in waste production by 2% relative to the FY2000 level • Zero waste disposal by Kobe Works (Machinery) and Akashi Works • Development of harmful chemicals reduction program • Promotion of total ban on use of PCB-using equipment
Environmental Communication	<ul style="list-style-type: none"> • Continued publication of environmental report, which contains site-specific data and environmental impact data for major affiliates • Promotion of communications with stakeholders • Positive cooperation in environmental activities of national and local governments 	<ul style="list-style-type: none"> • Continued publication of environmental report, which contains site-specific data • Establishment of a system of risk communication with stakeholders • Promotion of environmental volunteer activities

Environmental Management System

Activities for Acquiring ISO14001 Certification

In FY2002, Kobe Works (Shipbuilding) was awarded ISO 14001 certification, which marked the completion of making an Environmental Management System (EMS) for all the Kawasaki works in Japan.

The Nagoya Office received the designation of Eco-office that was created by Nagoya City. Kawasaki Head Office, branch offices and affiliates will continue to promote the establishment of EMS.



"Eco-office designation" of Nagoya Office

Company/Division	Year and month of certification	Reviewing & registering organization
Rolling Stock, Construction Machinery & Crushing Plant Company	Rolling Stock Division	2002.2 LRQA
	Construction Machinery Division	2000.5 JICQA
	Crushing Plant Business Division	2000.9 NK
Aerospace Company	Aerospace Company	2002.2 BSK
Gas Turbines & Machinery Company	Gas Turbine Division	2000.3 LRQA
	Machinery Division	2000.12 NK
Plant & Infrastructure Engineering Company	Power Plant & Industrial Plant Engineering Division	2001.2 NK
	Environmental Control Plant Division	1999.3 NK
	Steel Structure & Industrial Equipment Division	1999.11 JICQA
Consumer Products & Machinery Company	Consumer Products & Machinery Company	2000.2 DNV
Affiliates	Kawasaki Shipbuilding Corporation	
	Kobe Works	2002.8 NK
	Sakaide Works	2000.8 DNV
	Kawasaki Precision Machinery	1998.2 DNV

Reviewing & registering organization:
 LRQA: Lloyd's Register Quality Assurance
 JICQA: JIC Quality Assurance
 NK: Nihon Kaji Kyokai (ClassNK)
 BSK: Japan Defence Association
 DNV: Det Norske Veritas

Environmental Audit

Environmental Audit is performed at the following three levels:

- ① Environmental Management Hearing held by Environmental Management Department with all the internal companies and divisions.
- ② Internal Environmental Audits performed by each internal company and division within the scope of their EMS.
- ③ ISO 14001 EMS audit conducted by an outside reviewing and registering organization.

Environmental Management Hearing, held by our Environmental Management Department, was introduced in FY2001 as a practice that supersedes previous in-house environmental audits. This internal organization continually monitors and helps ensure that our 3-year EMAP and yearly activities and key measures are ap-

propriately developed and making achievements as expected. Discussion sessions are also held with company presidents so that environmental considerations are effectively reflected in business management. Through these activities, we intend to improve the environmental management levels of the whole group that is defined in our Medium- and Long-Term Environmental Vision.

To promote continued improvement through routine environmental management activities each internal company and division conducts an Internal Environmental Audit and commissions an ISO 14001 audit by an external organization. In particular, internal companies and divisions exchange information about the issues pointed out in a periodic audit by outside organizations, including improvements or preventive measures to improve the quality of their audit systems.

Risk Management

While environment-related laws and regulations are being enhanced or newly enacted, each internal company is fully involved in risk management so that established EMS functions satisfactorily and environment-related trouble is avoided.

Compliance with Laws and Regulations, and Pollution Prevention

In FY2002, we experienced the accidents summarized below, and investigated into the causes of each case and exercised a remedy. We are making efforts to avoid recurrence of similar accidents.

[Administrative provision]

· Sakaide Works: Some wastewater from the washing area flowed into the rainwater drainage channel. As a result, the pH and oil in the channel exceeded the standard values.

[Administrative warning]

· Shiga Combustion Laboratory: Iron rust inside the test furnace was expelled into the nearby residential area.

· Gifu Works: Approximately 10 L of solution containing hexavalent chromium spilled within the site.

· Kobe Works: Oil spilled from the fuel tank of a ship under repair.

Environmental Education

Based on an annual program, each internal company provides environmental education. The whole corporation periodically holds internal environmental audit training courses to train employees who will constitute the core staff for implementing EMS. In FY2002, we held six training sessions, and 118 persons were certified as internal auditors. During the FY1996-

To be able to promptly respond to inquiries about the environment or requests for information disclosure, and to maintain smooth communications with stakeholders (concerned parties) including local citizens and NPOs, we are considering starting a training course for prospective risk communicators.

[Violations, Accidents and Complaints in the Past 5 Years]

FY	1998	1999	2000	2001	2002
Judicial or administrative penalty	0	0	0	0	0
Administrative provision	1	4	0	0	1
Administrative warning	0	0	1	1	3
Resident complaints	3	2	0	4	2

- ※ ● Judicial or administrative penalty: Punishment by judicial or administrative authorities
 ● Administrative provision: Instructions imparted in writing (e.g. improvement order, etc.)
 ● Administrative warning: Verbal warning

In November 2002, in our Akashi Works, 0.22 mg/L of trichloroethylene, which is approx. 7 times higher than the environmental standard value, was detected in the ground water. We reported this fact to Akashi City authorities, and have been performing purification and monitoring.

FY2002 period, a total of 1,051 persons were trained including those from affiliates.

The number of people qualified as having knowledge about environmental protection is summarized in the tables to the right.

[Number of Qualified Pollution Control Managers]	
Air	80
Water	84
Noise	37
Vibration	26
Others (Dust, Senior Managers)	19
Total	246

[Number of Qualified Energy Managers]	
Heat	20
Electricity	23
Total	43

Environmentally Conscious Products

Recently, the requirement that industrial products have low environmental impacts has been given increased importance. Kawasaki, providing both "environmentally conscious products and technologies" and "products and technologies that contribute to environmental protection", wants to promote the formation of a sustainable society.

Product Assessment

For the environmental protection activities of FY2002, we encouraged each business division to start exercising environmental consciousness as early as possible in the product design phase. To this end, we attempted to promote the development and application of product assessment regulations.

At present, 10 out of 13 divisions have established these regulations, and the remaining three are on the way to establishing the regulations. The rate of implementation in five divisions has reached 100% for the subjects stipulated in the regulations and the number of cases of product assessment in the past two years has exceeded 120.

We are going to further increase the range of product assessment implementation and will revise the regulations as necessary to enhance their effectiveness.

[Implementation of Product Assessments in Past Years]

FY	1998	1999	2000	2001	2002
Divisions with regulation/Total divisions	1/14	7/14	10/14	11/14	10/13*
Cases of product assessment	10	47	69	138	123

*The total has decreased from the previous year due to the integration of two divisions.

LCA (Life Cycle Assessment)

LCA for model products has already been executed, and based on these results, efforts to disseminate the LCA technique to all business divisions have commenced.

Rolling Stock, Construction Machinery & Crushing Plant Company

We have studied the life cycle energy trend data provided by the Railway Technical Research Institute and each of the Japan Railway Companies to extend our LCA activities to rolling stock.

Aerospace Company

Aiming at finding a right direction of environmentally conscious products in the aerospace industries, LCA studies have started. In the studies, a simulation model that identifies what effects emerged with improvements, for example in material, will be developed.

Plant & Infrastructure Engineering Company

LCA for waste treatment was performed with the value anticipated in design and the actual value obtained from an actual facility. The results of the comparison between the actual and design values were reported to the Japan Society of Waste Management Experts (JSWME).

Consumer Products & Machinery Company

With the goal of developing a unified LCA technique for the automotive industry, we joined an LCA Subcommittee of the Japan Automobile Manufacturers Association, Inc. in which four motorcycle manufacturers are jointly studying LCA.

Kawasaki Shipbuilding Corporation

We are investigating and reviewing the feasibility of applying LCA techniques to propulsion system of ships. So far, a summary LCA for merchant ships has been performed on an experimental basis.

Green Procurement

We regard green procurement as one element of product assessment and are expanding this practice throughout Kawasaki in accordance with our Basic Policy of Green Procurement. So far, the scope of our green procurement, which began with the purchase of office supplies, is expanding to production stage.

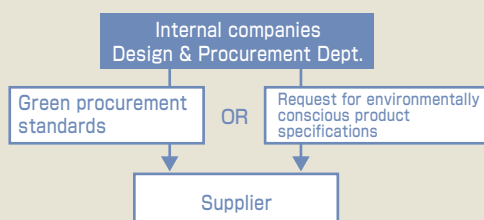
We are going to expand the green procurement rate through an e-Procurement System (starting in FY2003) for indirect materials. With this system, we will monitor the amount of materi-

als purchased by green procurement policy.

Additionally, to encourage the promotion of this practice by each internal company, we are developing procurement standards for equipment purchases for the environmental considerations that must be included in product specifications.

[Basic Policy of Green Procurement] Implemented in 1999

- ① Environmental impact must be considered across the entire lifecycle of all products from resource mining to waste.
- ② In the selection of a supplier, if multiple suppliers are equal in terms of quality, price and delivery, a supplier who is most seriously committed in environmental conservation is given priority over other suppliers.
- ③ Environmental product information must be obtained from suppliers.



Representative Products for Environmental Impact Reduction

80% Reduction in 30 Years

● Control of CO₂ emission for container ships

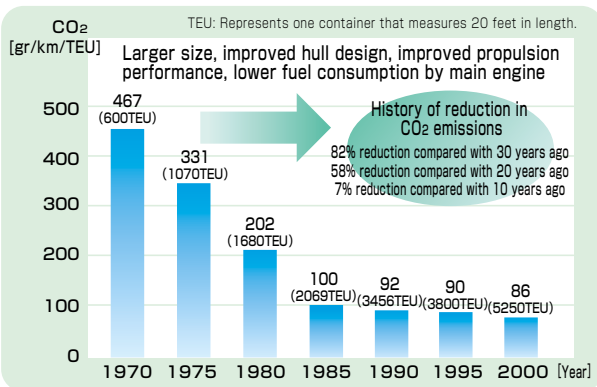
Container ships provide speedy maritime transportation for the large amounts of cargo that are vital for maintaining the abundance of modern lifestyles, but they consume fossil fuels including heavy oil and, in turn, emit CO₂.

In the work of developing container ships, Kawasaki fully employs its expertise in shipbuilding technology in order to contribute to global environmental preservation. Improvement of marine vessels requires a wide range of technology and a long time span. Over the past 30 years, we have succeeded in attaining dramatic decreases in CO₂ emissions

through larger ship size, improved hull design, enhanced propulsion performance and reduction in fuel consumption of the main engine. The CO₂ emissions associated with transportation of one container for 1 km dropped by 80% in the 30-year span from 1970 to 2000.

Compared with trucks and railway trains, container ships emit much less CO₂. Notwithstanding, we are determined to further reduce environmental impacts through continued technological innovation.

[CO₂ emission of transferring one container for 1 km by marine transportation]



Most modern container ship

10% Increase in Payload at Same CO₂ Emission Amount

● Control of CO₂ emissions for helicopter

In the aviation sector, helicopters play an important role in swiftly transporting personnel and cargo. Kawasaki has dramatically improved the performance of its BK117 helicopter by introducing newly designed main rotor blades and fuselage. This new design has also improved environmental efficiency.

In this design, the new main rotor blade is reverse-tapered toward the outer edge instead of the previous rectangular shape, and the outermost portion of the new blade has an oval shape. Though the newly designed fuselage was made larger than the one in the previous models in order to increase the transportation capacity, the fuselage drag is much smaller. The advantages of the new design are:

① Improved lift increases payload.

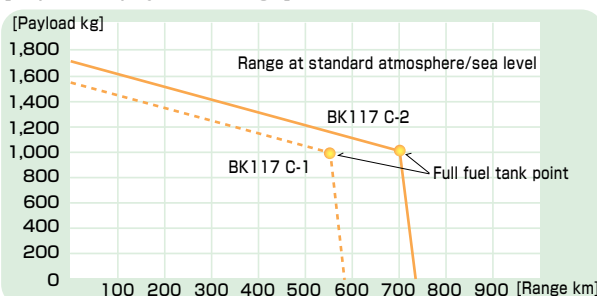
② Decreased fuselage drag increases the cruising speed.

The new main rotor blades were designed for the BK117 C-2, which is the newest model of the BK117 series helicopter. 400 BK117s have been sold so far in the civil helicopter market throughout the world. Though the C-2 is equipped with the same engine as its predecessor C-1, its maximum payload is 10% greater. This means that at the same total fuel consumption the C-2 can transport 10% more weight, reducing the CO₂ emissions per unit of payload.

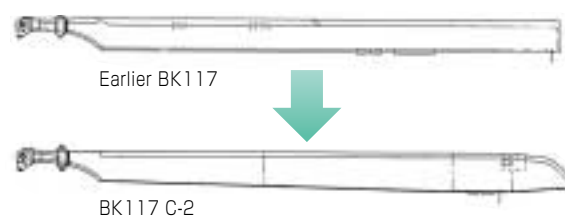


BK117 C-2

[Improved payload/Range]



■ Main rotor blade



Environmentally Conscious Products

Environmentally Conscious Products

Kawasaki has been committed to promoting "Design for Environment" (DfE) (through product assessment, LCA, etc.) for its major products. Furthermore, both the 4th Environmental Management Activities Plan drawn up this year and the key measures for FY2003 strongly emphasize the importance of DfE.

At present, we are determining the specific areas where our products and technologies need improvements from an environmentally consciousness viewpoint and implementing improvements wherever and whenever possible. Examples of these efforts are summarized in the table below.

※ The examples indicated with ① through ⑧ are described in detail on page 14.

Item	※	Example of Improvement Effort
Energy Consumption Efficiency	① ② ③	<ul style="list-style-type: none"> Light-weight rolling stock designs and direct-drive motors are introduced to help reduce the energy consumption during operation Adopted a system for decreasing tire slippage during the operation with wheel loaders, thereby improving fuel consumption Reduced weight, improved aerodynamics and adopted low power-consumption equipment on aircraft, thereby improving fuel consumption Reduced fuel consumption and noise emissions, and cleaner exhaust from the engines for future supersonic transport (SST) Reduced energy demand and NOx emissions by regeneration burner in hot strip mill Added convection part to the cooling boiler for a converter gas recovery system, thereby lowering gas temperature and increasing gas treatment capacity or dedusting efficiency Recovered uncombusted CO gas and sensible heat from a converter exhaust gas treatment system in order to reduce fuel consumption Incorporated fluidized bed for cement kilns, thereby reducing energy consumption below that of rotary kilns Installed waste heat recovery boiler (exhaust gas driven) at a cement plant to generate power, thereby reducing system power consumption Evaluated fuel consumption improvement rate of newly developed motorcycles against reference year in product assessment phase A novel bow form "Sharp Entrance Angle bow as an Arrow" (SEA-Arrow) was introduced that, by reducing wave-making resistance, improves the propulsion performance of vessels An energy-saving arrangement "Rudder Bulb System with Fins" (RBS-F) is added to the rudder that, by reducing the energy loss, improves the propulsion performance of vessels Electro-hydraulic hybrid system reduces the power consumption through adjusting the discharge rate of the hydraulic pump by controlling the speed of the pump
Greenhouse Gas Emissions		<ul style="list-style-type: none"> Reduced emissions of greenhouse gases resulted from the energy consumption reduction described above Reduced use of air conditioner refrigerant (CFC) in wheel loaders Information about the mandatory recovery of air conditioner refrigerant (CFC) in the wheel loader and the road roller is clearly indicated in the operation manual and warning label
Product Weight	④	<ul style="list-style-type: none"> Downsized all 19 models of back-up gas turbine generators, thereby greatly reducing weight The running speed of a steam turbine was increased by 12%, and by reducing the number of stages the weight of turbine was also reduced Adopted fluidized bed for cement kilns, thereby reducing equipment weight below that of rotary kilns Adoption of the hovering stage has enabled designs for unique multi-purpose domes (with baseball fields, soccer fields, etc.) to help promote resources conservation Set targets for newly developed motorcycles and evaluated weight reduction ratio in product assessment phase The ration of the weight of industrial robots to their load-bearing ability has been decreased Developed high specific output (high discharge rate per unit weight) hydraulic motor
Hazardous Substances/ Pollutants	⑤ ⑥	<ul style="list-style-type: none"> Changed rolling stock body material from steel to stainless steel to reduce paint consumption through a paint-free design Currently developing low NOx diesel engine for marine power generator The concentration of pollutants in exhaust gas was greatly decreased for construction machinery including wheel loaders In the development of the Super Marine Gas Turbine (for the Super Eco-Ship), great reduction in concentration of pollutants in exhaust gas was successfully demonstrated Use of PVC resin is limited in the electric counter for gas turbine engines Used atmospheric corrosion resisting steel members for bridge girders, thereby eliminating the need for painting or repainting Use of four-stroke engines on Jet Skis has realized low noise and emission levels Evaluated reduction of lead use in newly developed motorcycles against reference year in product assessment phase Confirmed compliance of motorcycles with exhaust gas reduction regulations and gained approval from countries around the world To decrease the amount of chlorinated rubber based coating used on marine vessels, polyurethane-based coating was introduced to replace chlorinated rubber based coating To decrease the amount of thinner used in the coating work of marine vessels, a solvent-free coating was introduced for fresh water tank coating Currently investigating the application of bio-degradable hydraulic fluid for hydraulic pump
Containers & Packaging		<ul style="list-style-type: none"> The wooden crates for tugboat propellers were replaced with steel racks to eliminate the use of wood materials Changed packaging for Jet Ski watercraft engines for overseas from wood and cardboard to returnable steel pallet-type Changed packaging for hydraulic equipment knockdown parts for overseas from steel container to basket-type returnable container
Product Service life	⑦	<ul style="list-style-type: none"> Implemented a maintenance following maintenance inspection schedule for gas turbines, thereby extending the service life A truss-type doweled composite slab is used as a highly durable slab for road bridges Evaluated model change interval for newly developed motorcycles in product assessment phase
Ratio of Use for Reusable & Recyclable Parts		<ul style="list-style-type: none"> Worn cast iron components (liners, etc.) are recovered from crushers and used as a raw material for castings Developed a system for reusing internal parts of shield machine Evaluated recycle rate of newly developed motorcycles in product assessments (90% or higher recyclable)
Product Disassembly Time		<ul style="list-style-type: none"> For wheel loaders and road rollers, use of metal embedded FRP components is discontinued Reduced number of parts used in motorcycles
Recovery of Used Products, Containers & Packaging		<ul style="list-style-type: none"> Material type is indicated by a symbol on resin components (wheel loaders, road rollers, emergency gas turbine power generators, hydraulic equipment, motorcycles) Currently promoting standardization of plastic materials used in back-up gas turbine generator
Vibrations & Noise	⑧	<ul style="list-style-type: none"> Adopted low noise-generating nose shape and optimally smooth profile of cars on rolling stock, thereby reducing noise Reduced number of pantographs in rolling stock and adopted streamlined, low noise-generating pantograph design Ultra-low noise level requirement was satisfied with compact vibration rollers Optimized the shape of the rotor blade section and blade tip in helicopters to reduce noise in flight Enveloped back-up gas turbine generator in package to reduce machine side noise emission to 55 dB A noise reduction hangar for testing aero-engines significantly reduces the noise occurring from engine testing on the ground Proposed effective noise reducing construction for subways using noise evaluation technology Estimated and reduced noise of steel viaduct for railway A soundproofing device is installed at the top of sound insulating walls to dampen road traffic noise effectively Confirmed compliance of motorcycles with noise reduction regulations and gained approval from countries around the world

E993 Series AC Train

①

- Lighter rolling stock reduces energy consumption during operation

The E993 Series AC Train, developed by the East Japan Railway Company Research & Development Center, is an environmentally conscious train model. Kawasaki is actively taking part in the development and manufacturing for this model. In the development, we not only employ ready-to-sort recyclable materials and structure to achieve zero waste disposal, but also incorporate a light-weight rolling stock design and a direct drive motor in order to further reduce energy consumption needed for operation and, thus, greatly reduce CO₂ emissions. Also, we are attempting to improve comfort for passengers by applying a barrier-free, low-noise design.

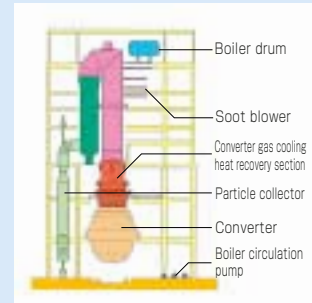


Oxygen Converter Gas Recovery System(OG) with Heat Recovery

②

- Decreases CO₂ emissions by approximately 380,000 t-CO₂ annually

Unburned CO from a steel-making converter is cooled and particles are collected, then the CO is used as fuel, etc. Additionally, the heat is recovered while the gas is cooled and then reused, thereby the energy utilization efficiency of the converter is greatly improved. The reduction in CO₂ emissions with this equipment in use at a large-scale steel mill that has three converter units each rated at 250 t/charge will amount to approximately 380,000 t-CO₂/year.



New Bow Form (SEA-Arrow)

③

- Reduces wave-making resistance by half, improving the propulsion performance of vessels

Kawasaki Shipbuilding Corporation has developed a new bow form called "Sharp Entrance Angle bow as an Arrow" (SEA-Arrow) that best suits medium-speed vessels such as LPG carriers. While retaining the effect of a bulbous bow, the SEA-Arrow reduces the wave-making resistance by half so as to improve the propulsion performance of vessels. Compared with the conventional one, this bow reduces the necessary main engine output by 6 to 10%, contributing to great energy saving.



Upper: New bow form (SEA-Arrow)
Lower: Conventional bulbous bow

Sapporo Dome Hovering Stage

④

- Hovering stage helps realize resource-conserving multi-purpose dome

The Sapporo Dome was one of the 2002 World Cup Soccer stadiums. This dome is a resource-conserving facility that is equipped for a variety of purposes, including a soccer field, a baseball field, and an event site. The natural lawn soccer field is usually kept outside the dome to promote the growth of the grass and returned to the inside of the dome before games. This unprecedented moving field is realized by a unique air-levitation (hovering) stadium system. Kawasaki proposed, fabricated and constructed this system together with the movable guest seats that make an opening when the field is being transferred.



Super Marine Gas Turbine

⑤

- Kawasaki established a new technology for realizing the Super Eco-Ship

Four companies including Kawasaki teamed up to organize a technical research joint-venture to develop the Super Marine gas turbine that has recently successfully completed a test. This engine can burn A type heavy oil and output 2,500 kW. The fuel consumption with this engine is approximately 30% less compared with conventional gas turbines. The NO_x emissions with this engine are as low as approximately 1/10 compared with diesel engines, and less than 1/3 compared with conventional industrial gas turbines. This high-performance gas turbine is the first step to the realization of our Super Eco-Ship, which is scheduled to be demonstrated in FY2007 and is part of the domestic vessel modernization project sponsored by the Japanese Ministry of Land, Infrastructure and Transport.



Low Noise and Emission Jet Ski—STX-12F

⑥

- Four-stroke engines have been incorporated into Jet Skis

Kawasaki has marketed its first Jet Ski model that runs on a four-stroke engine. Having been newly developed based on a world-class motorcycle engine, this engine boasts a high output, low noise and low emission levels, and meets the 2006 EPA and 2008 CARB regulations. The new Jet Ski design suppresses noise more effectively by incorporating a twin water muffler and a large capacity air intake box.



EPA: U.S. Environmental Protection Agency
CARB: California Air Resource Board

Highly Durable Slab for Road Bridges

⑦

- A truss-type doweled composite slab realizes a longer life for road bridges

A "truss-type doweled composite slab" is defined as a slab that is formed by welding a truss-type dowel (consisting of truss diagonals and chord members) to a bottom steel plate to prevent displacement, so as to form a composite member with the bottom steel plate and concrete. Compared with conventional reinforced concrete slab, our doweled composite slab is much more durable. Therefore, its long service life contributes to resource conservation in addition to the resource conservation effect in the construction work. We are developing and constructing this unique slab for road bridges at various sites.



All-Weather Engine Test Noise-Reduction Hangar

⑧

- Silences noise created by aero-engines during ground tests

The all-weather engine test noise-reduction hangar constructed at the Narita International Airport features roof and wall members capable of both sound absorption and sound insulation, as well as a uniquely designed construction that smoothly discharges engine blast, so the hangar can reduce the engine test noise of various aircraft types. This round-the-clock operation-capable facility efficiently enables the engine tests that are indispensable for the safe operation of aircraft.



Environmentally Conscious Products

Environmental Protection Products

Kawasaki is working on a number of products that protect the environment in diverse ways such as effective energy use, prevention of air, water and soil pollution, and waste treatment and recycling. Our FY2003 environmental key measures emphasize accurate understanding of the trends in the governmental environmental regulations and the environmental protection needs of society, as well as expansion of the scope of Kawasaki's

environmental protection products.

Some of the environmental protection products and technologies that help realize our environmental policies are summarized in the table below. We are confident these products and technologies contribute to society by solving many of the increasingly aggravated environmental problems.

*The examples indicated with ① through ⑧ are described in detail on page 16.

Technological Field		※	Product	※	Research & Development
Energy	Conservation and Effective Utilization of Energy		<ul style="list-style-type: none"> · Combined cycle power plant · Gas turbine co-generation system · Waste heat recovery boiler · Cement plant waste heat power generation system · Top-pressure recovery plant for blast furnace · High efficiency Low-NOx coal fired boiler · Ice storage cooling system · District heating and cooling system · Optimization and diagnosis of industrial energy system 	①	<ul style="list-style-type: none"> · High performance coal gasified generation technology · High performance gas turbine · Ceramic gas turbine · High efficiency combustion technology (Various combustion system/Engine) · Fuel cell power system · Advanced battery
	Renewable Energy System	②	<ul style="list-style-type: none"> · Photovoltaic system · Wind turbine generation system · Geothermal generation system · Co-generation system using biogas produced by methane fermentation of food and livestock waste 		<ul style="list-style-type: none"> · Black liquor gasification technology · Wood-based biomass energy utilization technology
	New Energy System				
Air Pollution Control	SOx/NOx Reduction, Dust Collection		<ul style="list-style-type: none"> · De-SOx/De-NOx plant and dust collector for flue gas · Low-NOx gas turbine generation system · Low-NOx slag-tap firing boiler · Low-NOx combustion system for heavy oil fired boiler · De-NOx system for road tunnel · Ventilation filter for road tunnel · Electrostatic precipitator for road tunnel 		<ul style="list-style-type: none"> · Low-NOx combustion technology (Gas turbine, Boiler, Diesel, Jet engine) · De-NOx technology for lower temperature flue gas
	Air Pollution Control		<ul style="list-style-type: none"> · Photocatalytic coating business (For environmental protection) 		
Water Pollution Control	Sewage/Sludge Treatment	③	<ul style="list-style-type: none"> · Sewage/Sludge treatment system · Reverse-osmosis membrane water treatment system (Recycled water etc.) · Sewage sludge processing system (Transformation of sludge into activated charcoal, fuel, fertilizer, etc.) · On vehicle sludge drying system · Turbid water filter 		<ul style="list-style-type: none"> · Dehydration technology for sludge · Membrane water treatment technology (Leachate etc.)
	Water Pollution Control				<ul style="list-style-type: none"> · Purifying technology for closed water basin
Soil Pollution Control	Decontamination of contaminated soil				<ul style="list-style-type: none"> · Cleaning technology for dioxin polluted soil
Waste Treatment/ Recycling	Waste Incineration	④	<ul style="list-style-type: none"> · High-performance refuse incineration system (Stoker-type furnace, Internal circulation fluidized bed-type furnace) 		<ul style="list-style-type: none"> · Monitoring technology for dioxin surrogates
		⑤	<ul style="list-style-type: none"> · Refuse gasifying-melting system (Fluidized bed-type gasifying-melting furnace, Shaft-type gasifying-melting furnace) · High-efficiency refuse power generation system (Power generation from refuse combined with gas turbine, etc.) · Waste-to-energy system (RDF power generation, Boiler for soda recovery, etc.) · Paper sludge burning power generation system · Flue gas treatment system for dioxin removal · Dioxin thermal decomposition system for fly ash 		
	Crushing, Sorting	⑥	<ul style="list-style-type: none"> · Bulky waste crushing and recycling system · Waste automobile/electrical appliance crushing and recycling system · Construction waste crushing and recycling system · Waste tire freeze-crushing system · Waste glass bottle/plastic sorting system 		
	Recycling, Pollution Control	⑦	<ul style="list-style-type: none"> · Incineration ash treatment system (Melting, Recycling) · Refuse derived fuel (RDF) production system (Domestic waste, Industrial waste) · Refuse paper and plastic fuel (RPF) production system · Treatment system for slag from refuse incineration ash · Food waste treatment system (Methane fermentation, Compost, Feed, etc.) · Livestock waste treatment system (Methane fermentation, Compost etc.) · Coal fired boiler's ash recycling system (Road base material etc.) · Ultrasonic air filter cleaning system (Reusing air filter) 		<ul style="list-style-type: none"> · Refuse incineration ash melting slag utilization technology · Refuse incineration ash utilization technology · Paper sludge ash utilization technology · Organic wastes treatment technology (Gasification, etc.) · Waste plastic gasification technology · Dredged mud recycling technology · Removing technology of unburned carbon in coal ash · PCB decomposition technology
	Radioactive Waste Treatment		<ul style="list-style-type: none"> · Radioactive waste treatment system 		<ul style="list-style-type: none"> · Nuclear reactor decommissioning technology
Others	Natural environment protection	⑧	<ul style="list-style-type: none"> · Beach Cleaner 		
	Monitoring & Measuring				<ul style="list-style-type: none"> · Offshore monitoring platform on greenhouse gases

Advanced Battery ①

● High-capacity version is available for power storage

Kawasaki has developed a unique high-capacity battery that uses granular-shaped active materials (electrode) that is the first of its kind in the world. The design is capable of being scaled-up in height, width and depth dimensions, allowing a higher-capacity battery pack to be made available easily. Thus, this battery is an ideal choice for storing electricity, and will greatly contribute to leveling the power load for fluctuating energy sources such as wind and solar power. Furthermore, this battery can not only be recycled easily, but it does not contain any harmful materials, such as lead or cadmium, or expensive materials, such as cobalt.



Wind Turbine Generation System ②

● System is optimized for Japanese climate to realize more common use

Kawasaki is actively developing and marketing wind power generation equipment, a power generation system that does not emit CO₂. The total estimated energy generation with our already installed wind power generation equipment has reached 35,000,000 kWh/year which is equivalent to a reduction of 12,950 t-CO₂/year. Currently, we are constructing a wind power generation plant that is rated at 16,000 kW in Sakata City. To cope with this expanding market sector, we are attempting to develop made-in-Japan controllers and generators that are optimized for the wind profile unique to Japan's climate.



Turbid Water Filter ③

● Eliminates sub-micron particles from process effluent and industrial wastewater

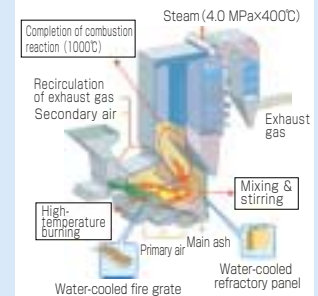
This filtering system efficiently captures sub-micron particles from turbid water with a hybrid filtration arrangement. This arrangement consists of a metal spring filter with a particle layer coated surface that serves as a filtration auxiliary, thus allowing the output of highly clean filtrate. We are now producing and marketing this unique filtering system that is an ideal choice for treating wastewater from the metal plating process, liquid coolant from machine tools, and wastewater from painting equipment. As the need for wastewater treatment equipment with excellent filtering performance grows, this unique compact system featuring low power consumption will find many users.



High-Performance Refuse Incineration System (Advanced Stoker-type Furnace) ④

● Low air ratio and high-temperature burning

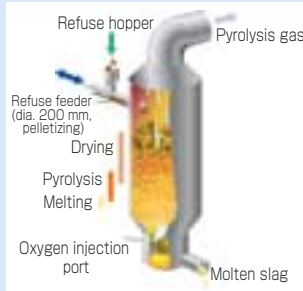
Introduction of a water-cooled fire grate has eliminated the need for cooling a fire grate by the combustion air, and the air volume can now be adjusted (low air ratio) to optimize the combustion characteristics of the furnace. Use of a parallel flow incinerator and exhaust gas recirculation arrangement has realized stable combustion (minimization of unburned CO) at a higher temperature. This effectively inhibits the occurrence of dioxins and decreases the amount of exhaust gas. In the current fiscal year, we were awarded a contract for this equipment by the Kishiwada-Kaizuka Municipal Public Cleaning Facility Cooperative. (A part of the specification has been modified.)



Refuse Gasifying-Melting System (Shaft-Type Gasifying-Melting Furnace) ⑤

● Refuse volume reduction to approximately 1/40

Using oxygen injection, this equipment gasifies and melts refuse and sludge at a high temperature. The equipment transforms ash into slag, thereby greatly decreasing the amount of refuse being disposed of in landfills. Use of oxygen helps decrease the amount of gas generated, leading to a compact design. The Minamata-Ashikita Regional Administrative Affairs Cooperative Clean Center, which treats domestic wastes, bulky wastes and sludge, adopted this system. Since then, the system has been effective in decreasing the amounts of dioxins and NO_x in the exhaust gas.



Waste Glass Bottle/Plastic Sorting System (Waste Plastic Material Sorter) ⑥

● Automatically sorts a bulk amount of waste plastic materials

When a plastic item is irradiated with near-infrared rays, it absorbs a particular waveband unique to its material type. This system sorts plastic materials. The system is capable of handling large amounts of plastic products including bottles, bags and trays as long as the products measure 30 mm or more. This compact and easy-to-operate system (multi-sorter) is very useful in material recycling for waste plastic materials, and helps support thermal recycling by reliably sorting RPF type plastic materials.



RPF: Refuse Paper & Plastic Fuel

Coal Fired Boiler's Ash Recycling System (Road Base Material) ⑦

● Safely utilizes coal ash

The amount of coal ash produced by coal-burning thermal power plants throughout Japan reaches 20,000 t/day. Hitherto, this coal ash has been used as a raw material for cement production or disposed of for land reclamation. However, owing to a decreasing demand for cement and a shortage of sites possibly used for land reclamation, it is necessary to find a different way to utilize coal ash. To address this problem, Kawasaki has developed a technique to transform coal ash into road base material by steaming. In our demonstration on an actual road construction work, the road base material has proven to be satisfactory in terms of workability, serviceability and safety.



Beach Cleaner ⑧

● Maintains litter-free clean beaches

When its rotating rubber rake and scraper plow a beach, the equipment scoops up litter together with beach sand. The sand is separated from the litter by our proprietary rotary-blade type separator. The sand is returned to the beach but litter, including separated bottles, cans and cigarette butts, is collected. The Kawasaki Beach Cleaner is available in either a self-propelled or towed model. With the towed model, the tractor can collect driftwood and concrete blocks. The Kawasaki Beach Cleaner is already in action on the beaches of many cities and villages.





Highly Efficient Internal Circulation Fluidized Bed-type Boiler

Feature Report—Environmental Business

Recycle Power Generation Technology

Capable of both refuse disposal and resource conservation by burning domestic garbage and industrial wastes as fuel, recycle power generation plants are being introduced at various locations throughout Japan. The total output of these plants reached the 1,000,000 kW level in FY2002. For use to become more common, this technology needs to be further developed.

Kawasaki has been working on power generation plants that burn various types of refuse and industrial waste as fuel, addressing the challenges of recycle power generation. In FY2002, we made great achievements as evidenced by the installment of Japan's largest RDF power generation plant, and advances in our efforts to develop efficient woody biomass burning power generation plants.

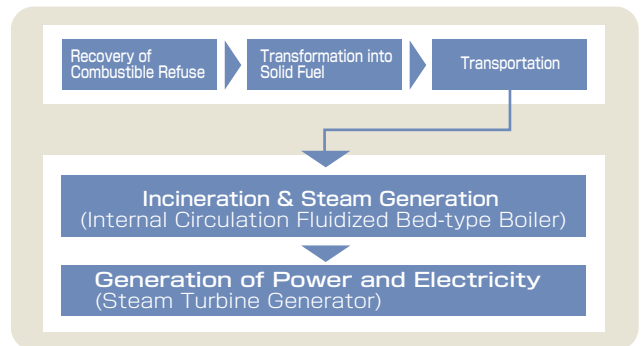
Product Introduction: Largest RDF (Refuse Derived Fuel) Power Generation Plant in Japan

● Control of dioxins by centralized refuse disposal, and RDF power generation

The RDF power generation generates electric power by burning a unique solid fuel (RDF) that is prepared by drying and reducing the volume of combustible refuses. One outstanding advantage of RDF power generation is that RDF is easy to transport and store compared to ordinary refuse. Another more important advantage is the capability of reliable dioxin control because smaller incinerators distributed in various municipalities, where dioxin control was very difficult, have been merged into a centralized large RDF power generation plant.

Currently, RDF power generation plants are operated at three locations in Japan to generate a total of 39,600 kW. In January 2003, in Japan's first regional environmental program, the Omuta Recycle Power Plant was commissioned with the sponsorship of many local governments. Kawasaki also took part in this program, providing Japan's largest RDF power generation plant.

[Schematic for RDF Electric Power Generation]



● Kawasaki employs a unique Internal Circulation Fluidized Bed-type Boiler with efficiency that is comparable to coal-burning boiler.

When refuse containing chlorine burns, a highly corrosive gas (hydrogen chloride) occurs. To prevent premature corrosion of the heat exchange tube by hydrogen chloride, the temperature in the heat exchange area needs to be limited. As a result, the steam obtained with conventional refuse burning power generation plant was limited to approx. 20 atm and 300°C, and the power-generation efficiency with the conventional plant was limited to approx. 20%.

To address this problem, Kawasaki has employed a fluidized-bed system and has developed a unique construction that can prevent corrosion of the heat exchange tube even at high temperatures by placing the heat exchange tube in an area that is relatively free

from hydrogen chloride. Since 1996, we have conducted demonstration tests on an experimental basis, and have developed proprietary technology for a highly efficient Internal Circulation Fluidized Bed-type Boiler.

Thanks to this technology, the boiler of the Omuta Recycle Power Plant succeeded in stably generating 83 atm and 503°C steam. The amount of RDF burnt a day reaches 315 t and the rated amount of generation is 20,600 kW. The power-generation efficiency with this system is 30% or higher, which is comparable with coal-burning thermal power generation.

● Kawasaki has established its own expertise in RDF processing plant.

Kawasaki is working in cooperation with Electric Power Development Co., Ltd. and Kitakyushu City to conduct test operations and developing a unique RDF processing plant.

For the RDF power generation project in Omuta, Kawasaki provided, together with other manufacturers, one of Japan's largest RDF processing plants (amount of refuse treated: 225 t/day, RDF production capacity: 122 t/day) to the Omuta/Arao Sanitation Union.

※The Omuta Recycle Power Plant is run by the Omuta Recycle Power Co., Ltd., which was founded and is financed by Fukuoka Prefecture, Electric Power Development Co., Ltd., etc. and 28 associated local governments, including Omuta City, in Fukuoka and Kumamoto prefectures. A total of seven cooperatives serving these 28 municipalities in Fukuoka and Kumamoto prefectures take part in RDF processing. Each cooperative transforms refuse collected in its area into RDF and transports the obtained RDF to the Omuta Recycle Power Plant.

○RDF production

The RDF used to fuel RDF power generation in Omuta is manufactured using domestic refuse from the region. The collected domestic refuse is first crushed to sizes suitable for drying, then dried with hot air blasts obtained by burning kerosene, then non-combustible matters such as steel, aluminum and glass are removed from the refuse. These separated materials are recycled. Next, the refuse is further pulverized, an antiseptic agent is added, and it is formed into RDF.



RDF forming machine and RDF

○Benefits of RDF

- RDF features a high density, because it is formed by compression, so it is conveniently stored and transported.
- RDF does not emit odor or putrefy, due to the drying and compression in the forming process and the addition of an antiseptic agent, and therefore it can be stored for an extended period.
- Uniform quality ensures good burning performance.

Product Introduction: Japan's First RPF (Refuse Paper & Plastic Fuel) Burning Waste Power Generation Plant

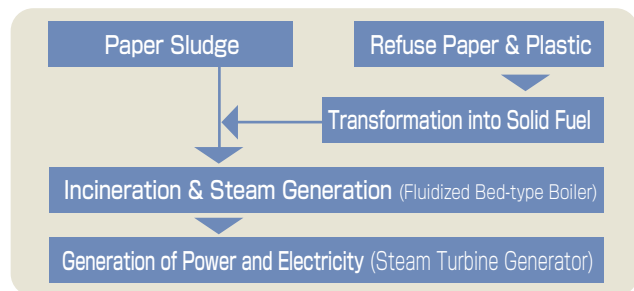
● Recycle power generation by burning used paper and waste plastic materials as fuel

RPF, which is a solid fuel derived from used paper and waste plastic, can be used as an auxiliary fuel for waste power generation that burns paper sludge.

Waste power generation plant delivered in December 2002 burns RPF and paper sludge in the fluidized bed-type boiler and attains a power-generation efficiency of 25.7%. It generates 10,000 kW of

electricity with steam generated at a rate of 50 t/h. Unlike conventional waste power generation plants, this plant burns paper sludge and RPF only rather than using fossil fuels, contributing to the reduction of CO₂ emission.

[Schematic for RPF Electric Power Generation]



RPF burning waste power generation plant
The capacity is one of the largest in Japan, burning 330 t/day of paper sludge and 50 t/day of RPF.

Product Introduction: Biogas Burning Power Generation Plant

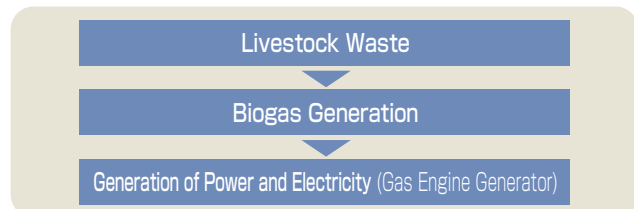
● Recycle power generation using livestock waste

A regulation on livestock waste left on fields is going to be imposed in the near future. To address this issue, Kawasaki is developing a biogas power generation plant that uses livestock waste-derived methane as fuel. We imported the technology for a methane fermentation tank within the biogas generation section. In Yubetsu-cho and Shimizu-cho, Hokkaido, we constructed biogas power generation plants that are currently operating on a commercial basis.

We will continue to run these plants, situated in the cold climate

of northern Japan where stable operation of biogas power generation plant is usually difficult, and work to develop the technology for economical biogas power generation plant that is suitable to Japan's climate.

[Schematic for Biogas Burning Power Generation]



Biogas power generation plant in Yubetsu-cho

Product Introduction: Woody Biomass Power Generation Plant

● Recycle power generation using waste wood and logs from forest thinning

Direct Burning—Steam Turbine System

This system generates electric power by driving a turbine with steam generated by burning woody biomass, and is suitable for applications that need both electricity and heat. In November 2003, 600 kW plant will be completed in Shirakawa-cho, Gifu Prefecture.

Pressurized Fluidized Bed Gasification—Gas Turbine System

Woody biomass is gasified in a pressurized fluidized bed gasifier, and the obtained combustible gas drives a gas turbine to generate electric power. The plant is compact and features high power generation efficiency. We are now developing plant rated from 30 to 600 kW.

Fixed Bed Gasification—Gas Engine System

Woody biomass is gasified in a fixed bed gasifier, and the obtained combustible gas drives a gas engine to generate electric power. The plant is simple and easy-to-operate, and 100 kW scale demonstration plant will be completed in September 2003.



Biomass power generation plant now under construction in Shirakawa-cho, Gifu Prefecture (artist's rendition)

Environmentally Conscious Production

We focus on energy saving and waste reduction. In terms of waste reduction, four of our thirteen works have already attained the goal of zero waste disposal. We are now determined to reduce harmful chemical substances and achieve the numerical targets set for the whole company according to our Greenhouse Gas Reduction Plan.

Energy Saving

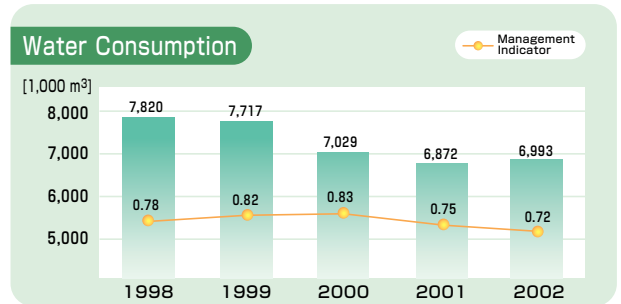
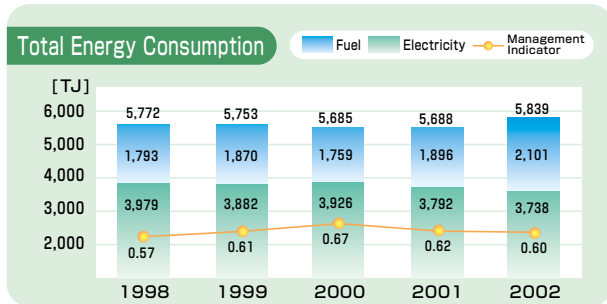
All Works and Offices are attempting to proceed with energy saving according to an Environmental Management Program (EMP). To this end, each works and office calls for energy saving actions that include turning off unnecessary lighting and appropriate temperature settings for air-conditioning in summer and winter, as well as reviewing expected energy saving effects before introducing equipment.

However, owing to the growth of our production, the electric power and fuel consumptions in FY2002 increased by 151 TJ

over FY2001. With this greater production taken into account, our environmental management indicator shows improvement. Water consumption in FY2002 was also 121,000 m³ greater compared to FY2001.

The co-generation plant newly introduced at the Akashi Works is going to be fully operative and great energy saving is expected.

The amounts of energy saving activities are based on the total quantity of heat (Joules) for both electricity and fuel.

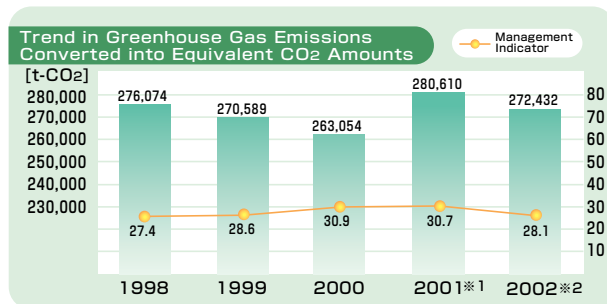


※Management Indicator: Total energy consumption, water consumption, and CO₂ emissions each divided by sales volume (including Kawasaki Shipbuilding and KPM).

Prevention of Global Warming

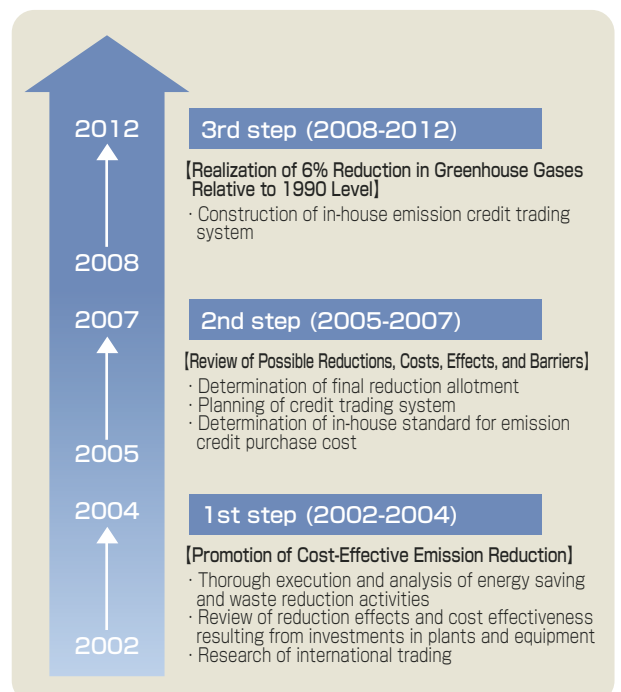
For energy saving and waste reduction, each works and office is investing money into plants and equipment that will be effective in reducing CO₂ emissions. In FY2002, the improvement reached 2.6 points on a management indicator basis. Also, the decrease in total emissions amounted to 8,200 t-CO₂.

We are now beginning to introduce "Efforts to Reduce Greenhouse Gas Emissions" at each internal company and major affiliates as a plan with the goal of carrying out cost effective emission reduction activities in the three steps defined below.

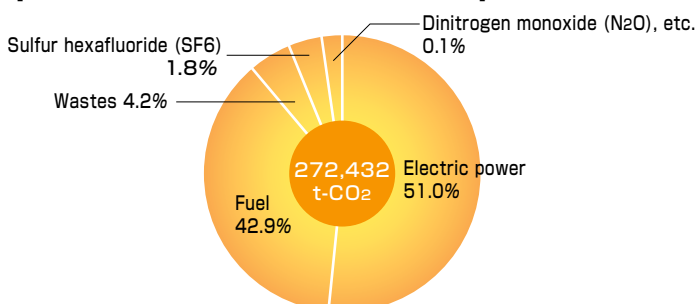


※1: SF₆ is included beginning with FY2001.
 ※2: Waste paper and waste wood are excluded from the materials emitted beginning with FY2002.

[Efforts to Reduce Greenhouse Gas Emissions]



[Breakdown of Greenhouse Gas Emissions]



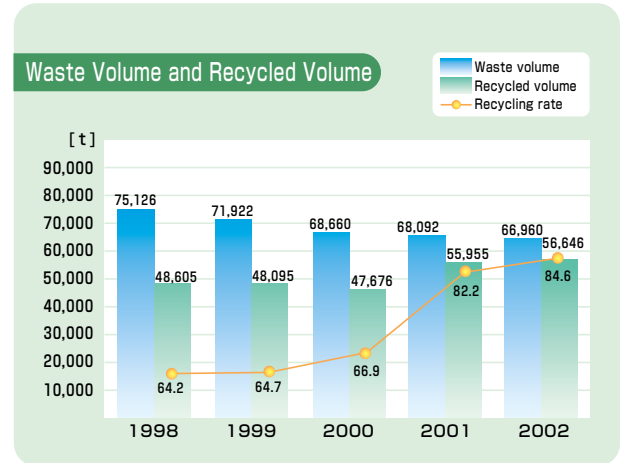
Waste Reduction

Improved Recycling Rate

We are actively applying the 3Rs—Reduce, Reuse and Recycle—to our activities and trying to reduce waste and promote recycling. In particular, our sorting and collection activities for recycling cover not only industrial refuse such as waste paper and waste wood but also industrial wastes such as used oil, waste plastic and metal scraps.

In FY2002 waste amounted to 66,960 tons, a reduction of 1,132 tons relative to FY2001 level. The amount recycled reached 56,646 tons, which corresponds with a recycling rate of 84.6% or an improvement of 2.4% over FY2001 level. We will further enhance our recycling activities until we attain a 100% recycling rate and zero waste disposal.

To comply with dioxin regulations, Kawasaki shut down every incinerator at all of our works by November 2002 and has outsourced waste disposal by incineration to local governments and recycling agents.



Hyogo Works Attained Zero Waste Disposal

We set a goal of zero waste disposal for all of our works by FY2004. Following three Works in FY2001, our Hyogo Works achieved zero waste disposal in FY2002. In the electric railcar production process of the Hyogo Works, 100% recycling of aluminum sand generated in the manufacturing process was achieved by introducing a sorting procedure with a vibrating sieve.

To reduce the amount of packaging used for equipment delivery, Hyogo issues returnable containers and encourage recovery of pallets by shipping agents.

The Kobe Head Office has encouraged careful sorting and collection of waste paper and has attained zero waste disposal.



Sorting bins with identifying illustrations at Hyogo Works

Chemical Substance Reduction

Compliance with PRTR Law

We intend to reduce use of chemical substances by improving manufacturing process and by introducing alternative materials. In particular, large emissions of xylene and toluene from paints are posing a challenge for Kawasaki. We are going to solve this problem by, for example, introducing water-based paints with

lower environmental impacts.

Gifu Works is attempting to reduce the use of dichloromethane by half through the introduction of an alternative substance.

The amounts of chemical substances discharged in FY2002 are summarized in the table below.

[Total of Chemical Substances Handled in FY2002]

(Unit: kg)

Gov't No.	Substance	Release into air	Release into public water area	Release into ground	Release subtotal	Transfer to public sewerage	Transfer as waste
[Type 1 Designated Chemical Substances]: 5,000 kg or more handled annually							
30	Bisphenol A	0.0	0.0	0.0	0.0	0.0	3,458.0
40	Ethyl benzene	122,419.4	0.0	0.0	122,419.4	0.0	5,949.7
43	Ethylene glycol	0.0	0.0	0.0	0.0	0.0	200.0
63	Xylene	624,284.7	0.0	0.0	624,284.7	0.0	42,883.8
68	Chromium and its trivalent compounds	51.6	24.0	0.0	75.6	0.0	40,163.0
100	Cobalt and its compounds	1.5	0.0	0.0	1.5	0.0	227.8
145	Dichloromethane (Also known methylene chloride)	92,844.0	15.0	0.0	92,859.0	0.2	7,640.0
177	Styrene	5,200.0	0.0	0.0	5,200.0	0.0	2,100.0
224	1,3,5-trimethyl benzene	0.0	0.0	0.0	0.0	0.0	80.0
227	Toluene	290,101.1	0.0	0.0	290,101.1	0.0	41,350.9
231	Nickel	3.6	1,330.0	0.0	1,333.6	0.0	4,543.0
266	Phenol	0.0	114.0	0.0	114.0	0.0	10,640.0
283	Hydrogen fluoride and its water-soluble salts	0.0	1,790.0	0.0	1,790.0	0.0	10,030.0
311	Manganese and its compounds	194.5	0.0	0.0	194.5	0.0	57,721.2
[Special Type 1 Designated Chemical Substances]: 500 kg or more handled annually							
69	Hexavalent chromium compounds	7.0	21.0	0.0	28.0	0.0	3,893.0
179	Dioxins (mg-TEQ)	3.3	0.4	0.0	3.7	0.0	0.0
232	Nickel compounds	0.0	0.0	0.0	0.0	0.0	3,040.0
299	Benzene	2.6	0.0	0.0	2.6	0.0	0.0

Environmental Communication

Beginning with FY2002, our environmental accounting also covers the effects of our environmental protection efforts in accordance with the Environmental Accounting Guidebook issued by the Ministry of the Environment. In order to help improve the environment in local communities, our works have committed themselves to volunteer activities. As an annual environmental report for the entire Kawasaki Group, Environmental Report 2003 contains a wide range of information including environmental data by production base.

Environmental Accounting

Our environmental accounting up to FY2001 covered only the costs of Environmental Facility Investments and Environmental Protection Costs. Beginning with the Environmental Report 2003, not only Environmental Protection Costs, but also Material Balance Effects and Money Effects are included as Environmental Protection Effects in accordance with the Environmental

Accounting Guidebook of the Ministry of the Environment.

By being able to understand visually Environmental Protection Costs, Material Balance Effects and Money Effects, we can analyze the cost effectiveness of environmental protection, make relevant management decisions, and support efficient and effective investment in environmental protection.

- Coverage: Works and offices in Japan of Kawasaki Heavy Industries, Kawasaki Shipbuilding and Kawasaki Precision Machinery
- Period: April 1, 2002 to March 31, 2003

[Environmental Protection Costs]

Unit:¥1,000

Classification		Typical activities	Investment	Expense ※
(1) Environmental protection cost required to reduce environmental impact generated in the business area through production and service activities (business field cost)			831,816	2,733,524
Breakdown	① Pollution prevention cost	· Compliance with laws and regulations · Pollution prevention equipment, and its operation and maintenance	539,389	920,464
	② Global environmental protection cost	· Energy saving activities · Energy saving equipment, and its operation and maintenance · Co-generation facility, and its operation and maintenance	94,165	646,110
	③ Resource circulation cost	· Reduction and proper disposal of wastes · Sorting and recycling of wastes · Zero waste disposal efforts, and associated equipment	198,262	1,166,950
(2) Cost required to reduce environmental impact generated upstream or downstream by production and service activities (upstream/downstream cost)		· Implementation of green purchasing · Product assessment · Environmentally conscious product improvement	255,350	2,693,260
(3) Environmental protection cost of management activities (management activity cost)		· Implementation of environmental education and training · Development and execution of EMS · Collection and monitoring of environmental data	0	469,170
(4) Environmental protection cost of R&D activities (R&D activity cost)		· Research & development of products that are easy on and protective of the environment	27,790	3,208,820
(5) Environmental protection cost of social activities (social activity cost)		· Cleanup of nearby environment · Tree planting at works · Participation in environmental group activities · Issuance of environmental reports	17,886	202,298
(6) Cost for restoring environmental damages (environmental damage cost)		· Decontamination of contaminated ground water · Pollution load levies	91,192	40,252
Total			1,224,034	9,347,324

※Includes depreciation expenses.

Unit:¥1,000

Item	Sum
Total investment during the applicable period	24,538,209
Total research & development expense during the applicable period	14,370,765

[Environmental Protection Effects (Material Balance Effects)]

Environmental impact index		Total amount	Increase or decrease		Comment
Greenhouse gas emissions	t-CO ₂	272,432	8,178	Decreased	See page 19
Energy consumption	TJ	5,839	151	Increased	See page 19
Water consumption	1,000 m ³	6,993	121	Increased	See page 19
Waste discharge amount	t	66,960	1,132	Decreased	See page 20
Waste recycling rate	%	84.6	2.4	Improved	See page 20
SOx emissions	kg	22,588	15,496	Decreased	See page 24
NOx emissions	kg	160,571	17,725	Decreased	See page 24
Dust emissions	kg	4,692	521	Decreased	See page 24

[Economic Effects (Money Effects) Resulting from Environmental Protection Activities]

Unit:¥1,000

Description of effects	Sum
Income obtained from recycling	234,932
Cost reduction from energy saving	256,421
Reduction in waste disposal expenses	2,641
Reduction in material costs resulting from enhanced resources	138,313
Total	632,307

Volunteer Activities & Contributions to Local Communities

The conduct guidelines in our Environmental Charter encourage activities that contribute to society. Accordingly, Kawasaki workers at all business locations actively take part in cleanup and weeding activities of nearby streets, rivers and parks, as well as do repair work on welfare centers, and support environmental NPO activities.



Cleanup of station plaza (Gifu Works)



Cleanup of neighborhood streets (Akashi Works)



Maintenance of Yashiro-no-mori Park in Hyogo Prefecture



Street cleanup (Hyogo Works)



Beach cleanup (Kobe Works)



Road cleanup (Sakaide Works)

Contributions to Society in the USA

In the USA, Kawasaki Foundation is taking part in fund-raising and volunteer activities in a diversity of areas including education, science, the fine arts, medicine and welfare.

Apart from the social contribution activities of Kawasaki's affiliates based in the USA, a foundation was created in 1992 to support Kawasaki's contributions to society throughout the USA.



Offered relief donations to 9.11 victims and their families



Letters of appreciation for contributions by the Kawasaki Foundation

Contributions to International Society and Local Communities

We have been welcoming trainees from developing nations under a program organized by the Japan International Cooperation Agency (JICA) to promote technical skills transfer to developing nations.

In addition, we accept study tours to our production facilities from nearby schools and open our sports facilities including sports grounds to nearby residents to contribute to local communities.



Trainees from developing nations (Akashi Works)



Escorted tour (Gifu Works)

Information Disclosure

We publish Environmental News four times a year to promote environmental consciousness of Kawasaki employees. We also issue quarterly in-house magazine Kawasaki that contains a serial story "Eco-mind" for helping the families of employees deepen their understanding of environmental issues.

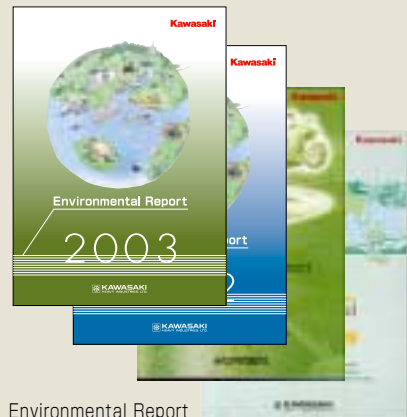
So that people outside Kawasaki having various viewpoints can understand our stance in environmental management and various environmental activities, we disclose environment-related information in our Environmental Report and on our web pages. Moreover, we reflect the opinions from readers in our environmental management activities.



Environmental News



Kawasaki in-house magazine



Environmental Report

Environmental Data

Since we are committed to the reduction of environmental impacts, we are promoting energy saving, the prevention of global warming, waste reduction, and chemical substance reduction. The table below summarizes the energy and resource inputs and outputs associated with our FY2002 business activities by internal company and major affiliates. In pages 25 and 26, the major products and representative environmental impact data are listed by production base.

Internal Companies/Affiliates

Performance Items※1		Units	Rolling Stock, Construction Machinery & Crushing Plant Company	Aerospace Company	Gas Turbines & Machinery Company		
Environmental impact caused by input of material, energy, etc.	Material input : Metals (steel, aluminum, copper, etc.)	ton	49,795	5,451	23,073		
	Material recycle amount	ton	23,757	0	0		
	Total energy consumption	Electric power	TJ	483	846	516	
		Fuel	TJ	145	360	494	
	Total	TJ	628	1,206	1,010		
	Recycled energy consumption	TJ	0	0	0		
	Water consumption	m ³	589,755	3,662,000	625,815		
	Water recycle amount	m ³	11,294	161,119	0		
	Recycled resource and recycled parts input	ton	0	0	0		
Amount of harmful material handled	kg	1,197,127	166,643	16,000			
Environmental impact upstream of business area	Green purchasing	1 mil yen	50	122	102		
Environmental impact caused by output of unnecessary things	Air	Greenhouse gas emission	t-CO ₂	32,319	56,265	50,135	
		Ozone depleting substance emission	ODP ton	0	0	0	
		SO _x emission	kg	1,334	12,043	8,254	
		NO _x emission	kg	3,328	20,384	103,314	
		Dust emission	kg	620	1,633	1,464	
		VOCs emission	kg	124,801	113,523	17,168	
		PRTR substance emission	kg	111,219	110,993	12,879	
		Concentration of emission-controlled substances when emitted	SO _x	PPM	Compliant※2	Compliant※2	Compliant※2
			NO _x	PPM	Compliant※2	Compliant※2	Compliant※2
			Dust	g/m ³ N	Compliant※2	Compliant※2	Compliant※2
			Dioxins	ng/m ³ N	Not applicable※4	Not applicable※4	Not applicable※4
		Concentration of emission-controlled substances when emitted	Benzene	mg/m ³ N	Not applicable※4	Not applicable※4	
	Noise and vibration generation	dB	Compliant※2	Compliant※2	Compliant※2		
	Odor generation	m ³ /min	Compliant※2	Compliant※2	Compliant※2		
	Water quality	Total discharge	m ³	325,073	1,481,424	156,414	
		PRTR substance discharge	kg	0.1	42	0	
		COD discharge/Nitrogen discharge/Phosphorus discharge	COD	kg	720	8,580	34
			Nitrogen	kg	1,006	22,776	30
			Phosphorus	kg	61	351	0
	Concentration of discharge-controlled substances when discharged		mg/L	Compliant※2	Compliant※2	Compliant※2	
	Soil quality	Total discharge of waste, etc.	ton	13,235	3,306	4,654	
		Reused resources	ton	0	0	5	
		Recycled resources	ton	11,832	1,630	3,273	
Resources subject to thermal energy recovery		ton	577	693	754		
Amount of waste		ton	80	148	500		
Final disposal waste		ton	752	474	82		
Specially controlled industrial waste		kg	84,930	203,050	41,712		
PRTR substance transfer		kg	79,113	41,769	3,120		
Environmental impact downstream of business area	Environmental impact caused by product characteristics		P13~14	P13~14	P13~14		
	Production and sale of environmental impact-reducing products		— ※3	— ※3	— ※3		
Environmental impact caused by transport	CO ₂ emission during transport	t-CO ₂	319	227	112		
	NO _x emission during transport	kg	2,108	1,118	269		
	Number of eco-vehicle introduced	unit	2	1	1		

- ※1. Performance items in the table above were taken from "State of Activities for Reduction of Environmental Burden" contained in the 2000 Environmental Reporting Guidelines of the Ministry of the Environment. Environmental data is given in the horizontal direction for internal companies as well as for a single group consisting of the head office, branch offices and technical institutes.
- ※2. The discharge concentration of regulated substances and the generation of noise, vibrations and odors are listed as "Compliant" or "Not Compliant".
- ※3. "—" is used when data was unavailable. "0" means the measured data was zero.
- ※4. "Not applicable" means there were no regulated facilities that create environmental impact.
- ※5. Data in [] is the percentage of increase/decrease from performance data of the previous year. Provided only where last year's data was available.

Plant & Infrastructure Engineering Company	Consumer Products & Machinery Company	Head Office, Branch Offices & Technical Institutes	Kawasaki Shipbuilding	Kawasaki Precision Machinery	Total	Comparison with Previous Year
50,297	167,230	106	171,051	19,371	486,374	[-4%]
51	1,699	0	1,900	0	27,407	
197	796	100	553	247	3,738	[-1%]
24	733	48	137	160	2,101	[+11%]
221	1,529	147	690	407	5,839	[+3%]
0	0	0	0	0	0	
163,407	976,700	80,892	717,240	176,876	6,992,685	[+2%]
31,923	30,407	0	26,327	32,926	293,996	[-37%]
20	0	25	0	0	45	
69,145	649,490	— *3	2,084,618	35,259	4,218,281	
205	233	11	7	1	731	
9,461	66,119	6,656	34,113	17,364	272,432	[-3%]
0	0	0	0	0	0	
0	479	— *3	465	13	22,588	[-41%]
160	21,970	— *3	984	10,431	160,571	[-10%]
0	750	— *3	76	149	4,692	[-10%]
50,725	238,574	— *3	579,899	28,145	1,152,835	
54,045	238,577	— *3	579,254	28,145	1,135,112	
Compliant**2	Compliant**2	Not applicable**4	Compliant**2	Compliant**2	Compliant**2	
Compliant**2	Compliant**2	Not applicable**4	Compliant**2	Compliant**2	Compliant**2	
Compliant**2	Compliant**2	Not applicable**4	Compliant**2	Compliant**2	Compliant**2	
Not applicable**4	Compliant**2	Not applicable**4	Not applicable**4	Not applicable**4	Compliant**2	
Not applicable**4	Not applicable**4	Not applicable**4	Not applicable**4	Not applicable**4	Not applicable**4	
Compliant**2	Compliant**2	Not applicable**4	Compliant**2	Compliant**2	Compliant**2	
Compliant**2	Compliant**2	Not applicable**4	Compliant**2	Compliant**2	Compliant**2	
83,753	558,231	27,925	448,273	58,778	3,139,871	[-24%]
0	3,252	— *3	0	0	3,295	
418	5,751	0	739	539	16,781	
255	13,337	— *3	— *3	364	37,768	
49	516	— *3	— *3	79	1,056	
Compliant**2	Compliant**2	Compliant**2	Compliant**2	Compliant**2	Compliant**2	
5,259	15,378	182	22,141	2,806	66,960	[-2%]
0	5,589	0	15	0	5,609	
4,920	3,551	79	19,122	2,689	47,096	[+1%]
220	1,233	100	252	112	3,941	
27	2,986	3	1,396	0	5,140	[-20%]
56	1,481	0	1,242	5	4,092	[-29%]
2	583,872	0	60,961	2,484	977,011	[+15%]
10,281	24,300	0	69,044	6,293	233,921	
P13~14	P13~14	P13~14	P13~14	P13~14	P13~14	
— *3	— *3	— *3	— *3	— *3	— *3	
330	14,280	2	0	91	15,360	
1,895	98,828	8	0	315	104,541	
0	8	0	0	0	12	

Environmental Data

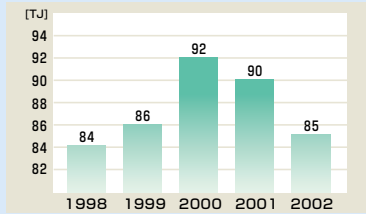
Production Base

Wastes: ■ Discharged amount ■ Recycled amount —●— Recycling rate

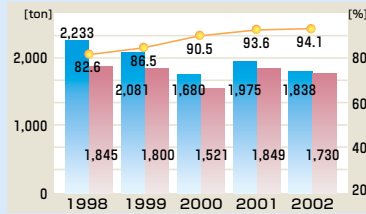
Noda Works

- Major products: General steel structures, airport facilities, steel pipe structures, bridges, and tanks
- Address: 118, Futatsuzuka, Noda, Chiba 278-8585 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	NA
NOx	NA
Dust	NA

[Amount released into public water (kg)]

COD	387
Nitrogen	121
Phosphorus	27

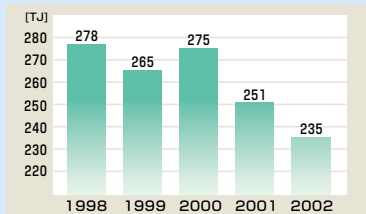


Noise-reduction hangar

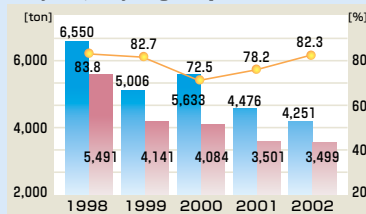
Yachiyo Works

- Major products: RPF production facilities, crushers, pulverizers, steel products, cast iron products
- Address: 1780, Kamikoya, Yachiyo, Chiba 276-0022 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	1,324
NOx	2,897
Dust	611

[Amount released into public water (kg)]

COD	254
Nitrogen	635
Phosphorus	44



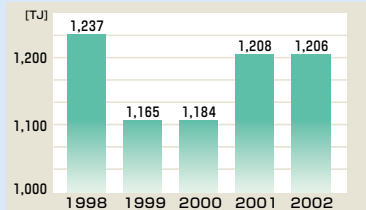
Bucket wheel excavator (BWE)

Gifu Works

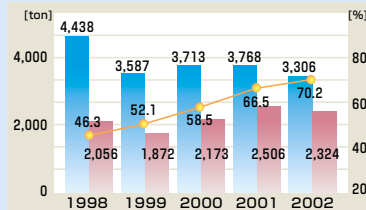
(including Nagoya Works 1 and Nagoya Works 2)

- Major products: Aircraft (including helicopters), spacecraft, aviation-related facilities and equipment
- Address: 1, Kawasaki-cho, Kakamigahara, Gifu 504-8710 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	12,043
NOx	20,384
Dust	1,633

[Amount released into public water (kg)]

COD	8,580
Nitrogen	22,776
Phosphorus	351



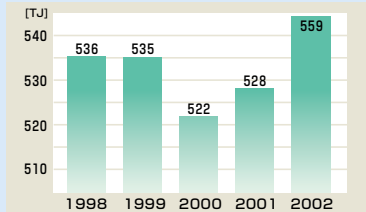
Medical emergency helicopter BK117

Kobe Works

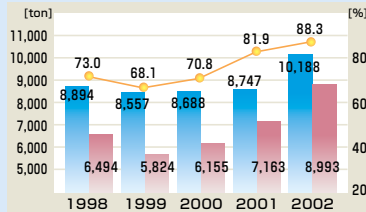
(including Kawasaki Shipbuilding)

- Major products: Marine vessels & equipment, submarines, land & marine turbines and diesel engines
- Address: 3-1-1, Higashikawasaki-cho, Chuo-ku, Kobe, Hyogo 650-8670 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	8,254
NOx	102,499
Dust	1,433

[Amount released into public water (kg)]

COD	33
Nitrogen	30
Phosphorus	0.07

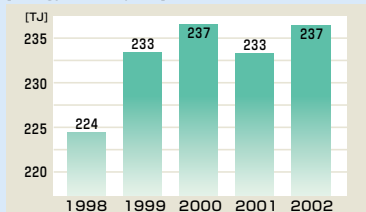


Marine steam turbine (UA-type)

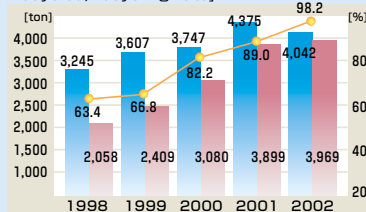
Hyogo Works

- Major products: Rolling stock, automated guideway transport, platform doors
- Address: 2-1-18, Wadayamadori, Hyogo-ku, Kobe, Hyogo 652-0884 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	10
NOx	431
Dust	9

[Amount released into public water (kg)]

COD	23
Nitrogen	21
Phosphorus	0.53

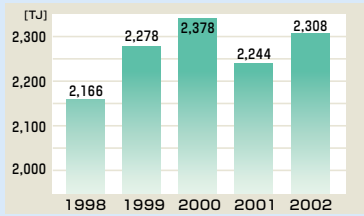


Rolling stock

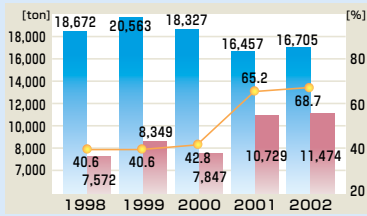
Akashi Works (including Seishin Works)

- Major products: Motorcycles, robots, jet engines, and general-purpose gas turbines
- Address: 1-1, Kawasaki-cho, Akashi, Hyogo 673-8666 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	479
NOx	22,785
Dust	781

[Amount released into public water (kg)]

COD	5,751
Nitrogen	13,337
Phosphorus	516

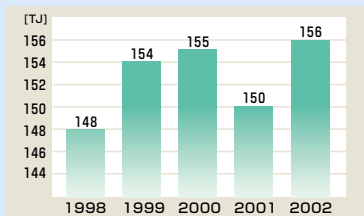


Super Sports Series

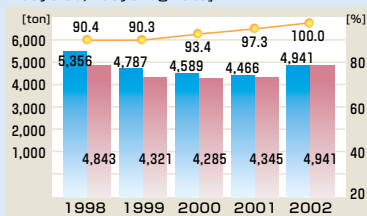
Banshu Works

- Major products: Civil engineering machinery, cargo handling machinery
- Address: 2680, Oka, Inami-cho, Kako, Hyogo 675-1113 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	NA
NOx	NA
Dust	NA

[Amount released into public water (kg)]

COD	443
Nitrogen	350
Phosphorus	16

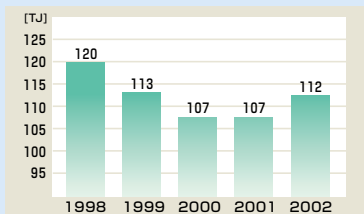


Wheel loader

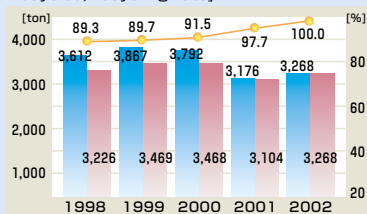
Harima Works

- Major products: Plants, environmental protection equipment, boilers, civil engineering/construction machinery, steel structures
- Address: 8, Nijima, Harima, Kako, Hyogo 675-0155 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	NA
NOx	160
Dust	NA

[Amount released into public water (kg)]

COD	31
Nitrogen	135
Phosphorus	22

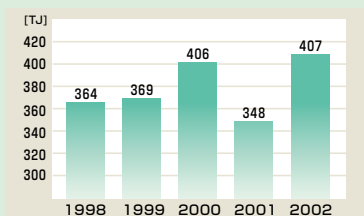


Large diameter shield machines

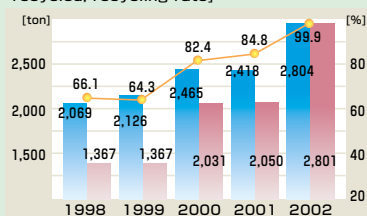
Nishi-Kobe Works (Kawasaki Precision Machinery)

- Major products: Industrial hydraulic devices, marine machinery, and precision equipment/devices
- Address: 234, Matsumoto, Hasetani-cho, Nishi-ku, Kobe, Hyogo 651-2239 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	13
NOx	10,431
Dust	149

[Amount released into public water (kg)]

COD	539
Nitrogen	364
Phosphorus	79

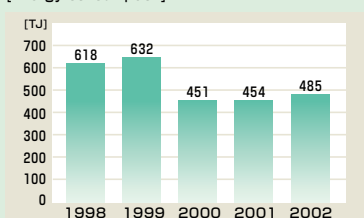


Hydraulic equipment

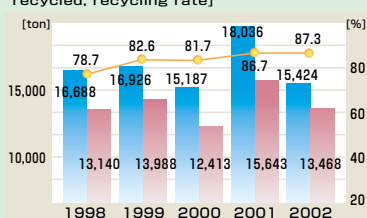
Sakaide Works (Kawasaki Shipbuilding)

- Major products: Marine vessels, marine equipment (LNG/LPG ships, container ships, oil drilling rigs, etc.)
- Address: 1, Kawasaki-cho, Sakaide, Kagawa 762-8507 Japan

[Energy consumption]



[Amount of waste discharged, amount recycled, recycling rate]



[Amount released into the atmosphere (kg)]

SOx	465
NOx	984
Dust	76

[Amount released into public water (kg)]

COD	739
Nitrogen	—
Phosphorus	—

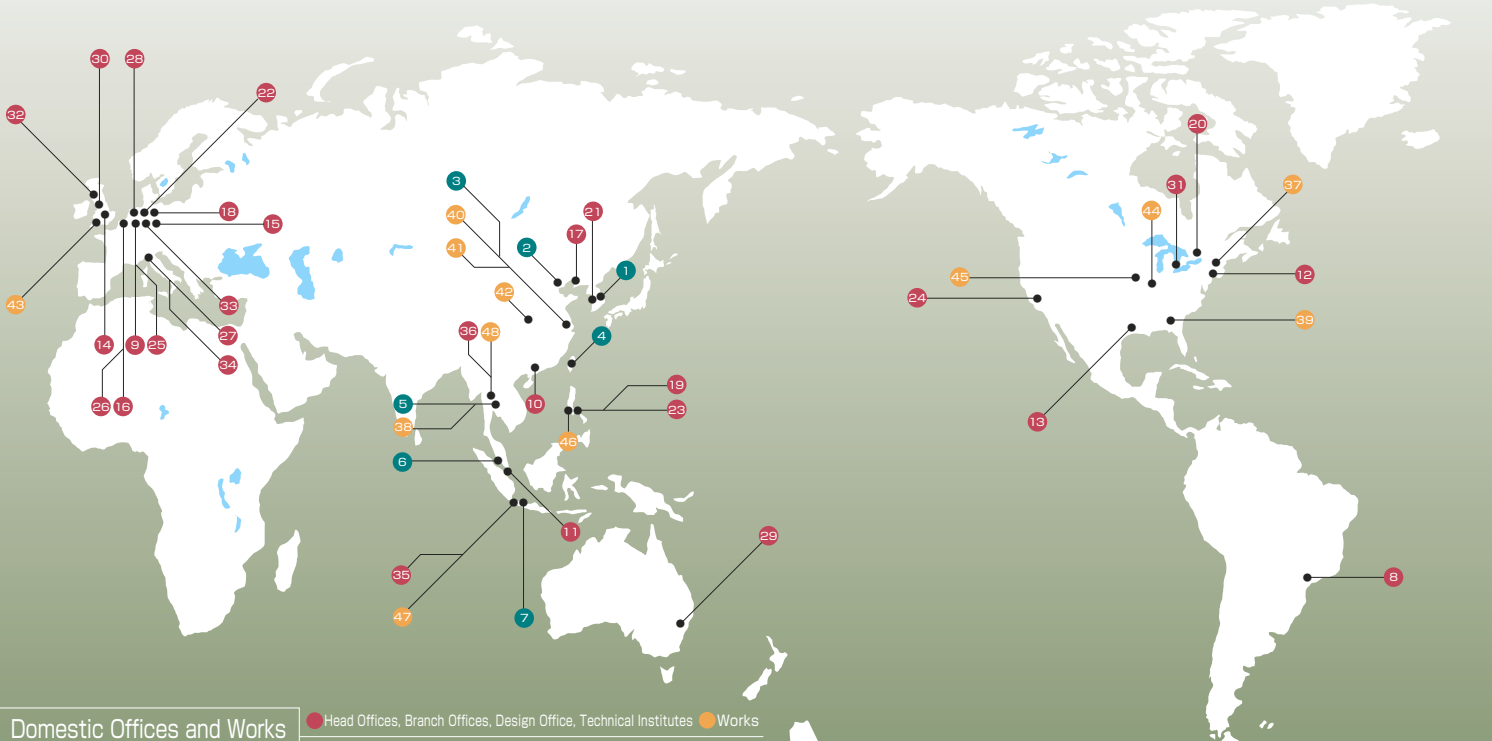


LPG carrier

Global Network

● Overseas office ● Overseas affiliate (sales) ● Overseas affiliate (production)

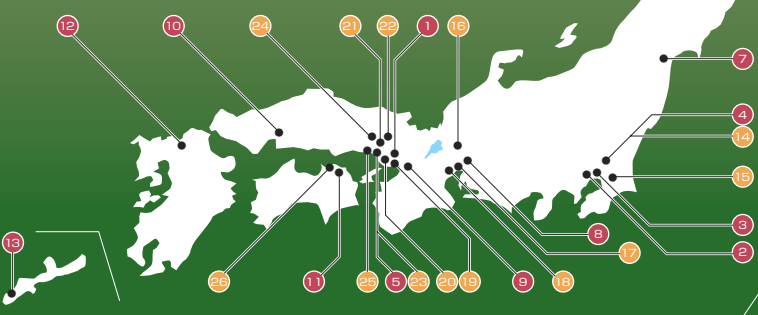
- 1 Seoul Office
- 2 Beijing Office
- 3 Shanghai Office
- 4 Taipei Office
- 5 Bangkok Office
- 6 Kuala Lumpur Office
- 7 Jakarta Office
- 8 Kawasaki do Brasil Industria e Comércio Ltda.
- 9 Kawasaki Heavy Industries (Europe) B.V.
- 10 Kawasaki Heavy Industries (H.K.) Ltd.
- 11 Kawasaki Heavy Industries (Singapore) Pte. Ltd.
- 12 Kawasaki Heavy Industries (U.S.A.), Inc.
- 13 Kawasaki Heavy Industries (U.S.A.), Inc. (Houston Branch)
- 14 Kawasaki Heavy Industries (UK) Ltd.
- 15 Kawasaki Heavy Industries G.m.b.H.
- 16 KHI Europe Finance B.V.
- 17 KHI (Dalian) Computer Technology Co., Ltd.
- 18 Kawasaki Gas Turbine Europe G.m.b.H.
- 19 KHI Design & Technical Service Inc.
- 20 Canadian Kawasaki Motors Inc.
- 21 Kawasaki Machine Systems Korea, Ltd.
- 22 Kawasaki Motoren G.m.b.H.
- 23 Kawasaki Motors (Phils.) Corporation
- 24 Kawasaki Motors Corp., U.S.A.
- 25 Kawasaki Motors Europe N.V.
- 26 Kawasaki Motors France S.A.
- 27 Kawasaki Motors ITALY S.p.A.
- 28 Kawasaki Motors N.V.
- 29 Kawasaki Motors Pty. Ltd.
- 30 Kawasaki Motors (UK) Ltd.
- 31 Kawasaki Robotics (U.S.A.), Inc.
- 32 Kawasaki Robotics (UK) Ltd.
- 33 Kawasaki Robotics G.m.b.H.
- 34 Tiesse Robot S.p.A.
- 35 P.T. Kawasaki Motor Indonesia
- 36 Kawasaki Motors Enterprise (Thailand) Co., Ltd.
- 37 Kawasaki Rail Car, Inc.
- 38 Khitkan Co., Ltd.
- 39 Kawasaki Construction Machinery Corp. of America
- 40 Nantong Cosco KHI Ship Engineering Co., Ltd.
- 41 Shanghai Cosco Kawasaki Heavy Industries Steel Structure Co., Ltd.
- 42 Wuhan Kawasaki Marine Machinery Co., Ltd.
- 43 Kawasaki Precision Machinery (UK) Ltd.
- 44 Kawasaki Motors Manufacturing Corp., U.S.A. (Maryville Plant)
- 45 Kawasaki Motors Manufacturing Corp., U.S.A. (Lincoln Plant)
- 46 Kawasaki Motors (Phils.) Corporation
- 47 P.T. Kawasaki Motor Indonesia
- 48 Kawasaki Motors Enterprise (Thailand) Co., Ltd.



Domestic Offices and Works

● Head Offices, Branch Offices, Design Office, Technical Institutes ● Works

- 1 Kobe Head Office
- 2 Tokyo Head Office
- 3 Tokyo Design Office
- 4 Noda Technical Institute
- 5 Akashi Technical Institute
- 6 Sapporo Office
- 7 Sendai Office
- 8 Nagoya Office
- 9 Osaka Office
- 10 Hiroshima Office
- 11 Shikoku Office
- 12 Fukuoka Office
- 13 Okinawa Office
- 14 Noda Works
- 15 Yachiyo Works
- 16 Gifu Works
- 17 Nagoya Works 1
- 18 Nagoya Works 2
- 19 Kobe Works
- 20 Hyogo Works
- 21 Nishi-Kobe Works
- 22 Seishin Works
- 23 Akashi Works
- 24 Banshu Works
- 25 Harima Works
- 26 Sakaide Works



Contacts:
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 Chuo-ku, Kobe 650-8680, Japan
 Phone: 81-78-371-9542 Fax: 81-78-360-8700
 Kawasaki Web Site
<http://www.khi.co.jp/earth/english/index.html>