三菱マテリアル

2004環境報告書

2004 Environmental Report

三菱マテリアル株式会社
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2004 Environmental Report Mitsubishi Materials Corporation

contents

* About This Report

Editorial Policy

Since our first Environmental Report published in 1999, we at Mitsubishi Materials Corporation have been preparing our environmental reports with reader-friendliness in mind; our reports follow all appropriate guidelines and we welcome readers' opinions. In this issue, we are following the Global Reporting Initiative (GRI), which quite a number of companies use as global guidelines for their environmental/sustainability reports. We still have many issues to solve concerning data compilation and which subjects to include in the report, and we will continue to improve the quality of our reports. This time we have made efforts to treat issues in a more organized manner than in our 2003 report. Accordingly, we explain this year's achievements in environmental conservation in Chapter 1, and address our efforts to promote a resource recycling society through our business operations in Chapter 2.

Please visit our website for more detailed information on the initiatives described in this report.

Coverage

This report covers information about environmental management at Mitsubishi Materials Corporation's Headquarters, Companies, and plants and facilities up to the end of December 2004 (April 2003 through the end of March 2004 for data on our achievements in environmental conservation). Chapter 2 includes information about Mitsubishi Materials group companies as well.

Contact

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Mesages from Directors

I would like to offer my greetings on the release of the 2004 Environmental Report. Being a comprehensive materials manufacturer, we at Mitsubishi Materials not only supply a variety of raw materials that are essential for society; we are also making use of our cutting-edge manufacturing technologies and infrastructure to build a recycling-oriented society, and by extension, a sustainable society through enthusiastic efforts to reuse the useful resources that are incorporated in waste. With the aim of stable growth, our management philosophy includes surviving in the industry and sharing our inspiration. In recent times, we are also focusing on corporate values and social reliability as well as achieving our target numerical indicators for business management.
To this end, it is essential for us to share our ideas with stakeholders in the community and throughout the world. For corporate social responsibility (CSR) activities, which include risk management to prevent critical situations and compliance schemes, we have established a CSR Committee and CSR Dept. in January 2005 to support a corporate-wide approach.
Amongst our other activities, in corporate-wide environmental management, we are putting the focus on green productivity management (GPM) by reviewing Mitsubishi Materials Environmental Policy to contribute to developing environment-friendly business activities and establishing a recycling-oriented society.
The Environmental Policy covers all aspects of the topics in this report, namely, further reductions in the consumption of chemicals and waste disposal and a decrease in the basic energy unit, not to mention efforts to move towards "green" procurement and "green" logistics. Supported by proactive public/investor relations activities and close communications with our stakeholders, we are committed to producing significant results that will maximize our corporate value.
We hope that you will read this report and give us your honest opinion. We ask once again for your continued support and understanding.

January 2005
Akihiko Ide
President

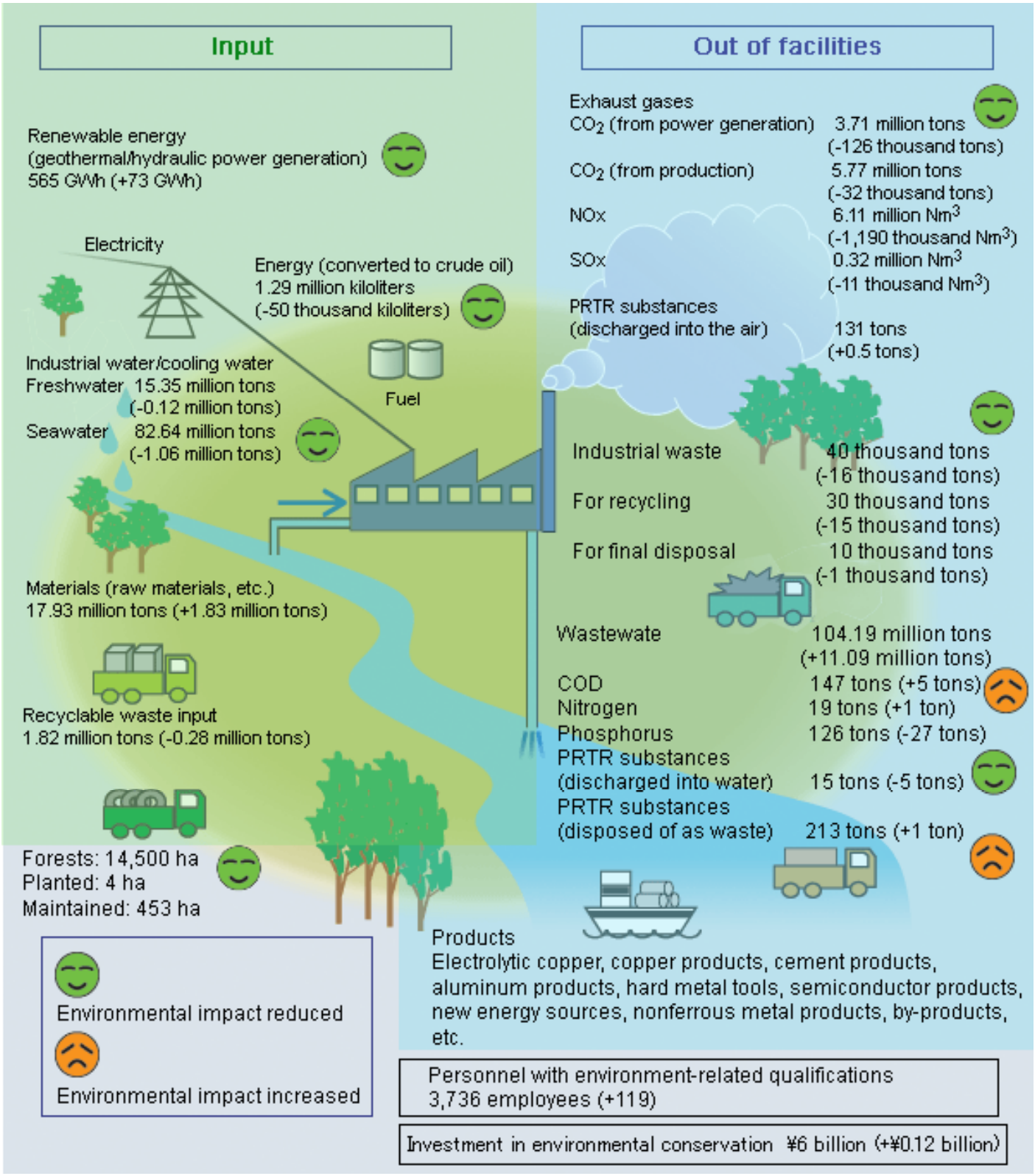
Mitsubishi Materials established an environmental management division in 1970 to promote environmental activities including measures to prevent any pollution that our business activities generate. In 1998, a GPM Committee was created to promote comprehensive discussions and studies throughout the corporation and thus to strengthen our efforts in this area. By the end of fiscal 2002, all our production sites had been equipped with environmental management systems, and started to deal with their own individual situations by setting appropriate goals. These corporate-wide efforts have brought favorable results, especially in reducing the amount of industrial waste for final disposal, promoting recycling and energy conservation, and reducing CO_2 emissions. We continue to strengthen our green productivity management (GPM) activities, especially in further reducing environmental impact and the waste produced by production activities, as well as imposing stricter regulations on the use of chemical substances. As the result of drawing up a corporate-wide policy, we continue all-out efforts to reduce environmental impact, starting with areas that have the biggest impact, while bringing into clearer focus green procurement and logistics, areas to which we have thus far paid less attention.
Efforts in our business operations include the use of recycled materials in the manufacture of cement, metals, and aluminum, the creation of recyclable energy sources for geothermal/hydraulic power generation, extensive efforts to conserve energy by maintaining the forests we own and planting trees at our facilities, reductions in CO_2 emissions, efficient use of natural resources, and ecosystem conservation projects.
We are striving to find a solution to the soil pollution issue at Osaka Amenity Park (OAP) that will convince both the residents of the local community and society as a whole, while dealing openly with the requirements imposed by the legislative and administrative authorities.

January 2005
Koichi Kitamura
Managing Director and Chief Green Officer (CGO)

Chapter 1: Annual Achievements in Environmental Conservation Activities

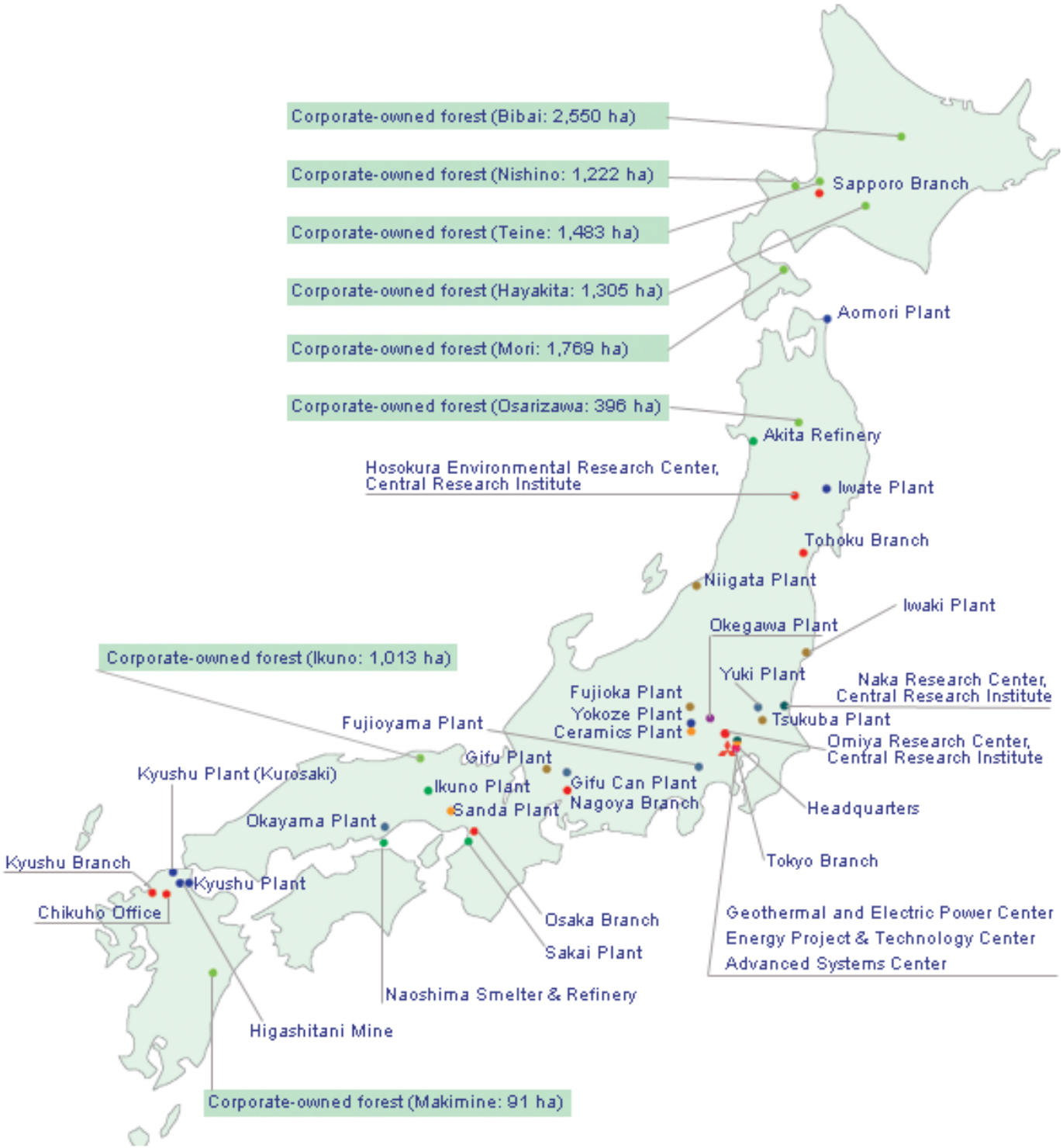
Summary of Our Activities

Inputs/outputs in Mitsubishi Materials' major business activities
(Figures in parentheses stand for increases/decreases over fiscal 2002)



Business Summary and Domestic Network

As a comprehensive materials manufacturer, at Mitsubishi Materials we run a variety of business operations, as summarized below. We classify our businesses into two areas, namely, Core Business and Strategic Business in order to support robust profitability and quick-response management. Our business aims are to carefully manage corporate portfolios, accelerate selective and intensive business operations, and remain a corporate group that manufactures products of outstanding quality.



<Core Business>
Our Core Business sector consists of the following four businesses, which are highly competitive in their relevant industries and the mainstay of the Mitsubishi Materials Group.

-- Cement Company	
Major products:	Portland cement, special cement, cementation materials, etc.
Facilities:	Aomori Plant, Iwate Plant, Yokoze Plant, Higashitani Mine, and Kyushu Plant
-- Aluminum Company	
Major products:	Aluminum cans for beverages, etc.
Facilities:	Yuki Plant, Fujioyama Plant, Gifu Can Plant, Okayama Plant
--Metals Company	
Major products:	Copper, copper alloy, processed copper products, precious metals, tin, rare metals, lead, lead alloy, etc.
Facilities:	Akita Refinery, Sakai Plant, Naoshima Smelter & Refinery, Ikuno Plant
-- Powder Metallurgy Products & Tools Company	
Major products:	Hardened metals, sintered parts, small motors, diamond cutting tools
Facilities:	Tsukuba Plant, Gifu Plant, Niigata Plant, Fujioka Plant, Iwaki Plant

<Strategic Business>
Secondary to our Core Business, the Strategic Business sector consists of the following businesses. Future growth is expected and we are allocating more managerial resources to grow these businesses to form a new category under the Core Business sector.

-- Advanced Products Strategic Company	
Major products:	Electronic devices, electronic materials, etc.
Facilities:	Ceramics Plant, Sanda Plant
-- Energy & System Strategic Company	
Major products:	Geothermal power generation, nuclear fuel cycle, petroleum, LPG, coal, fusion furnace for producing gas, etc.
Facilities:	Geothermal and Electric Power Center, Energy Project & Technology Center, Advanced Systems Center
-- High Performance Alloy Products Division	
Major products:	Nonferrous metal products (copper, nickel, etc.), precision casting, precision forging
Facilities:	Okegawa Plant
-- Precious Metals Division	
Major products:	Gold, silver, gold coins, platinum, jewelry, etc.
-- Silicon Division	
Major products:	Polycrystal silicon, silicon wafers
-- Resources & Environment Management Div. Division	
Recycling of used household appliances, office equipment, and concrete waste, etc.	
-- Real Estate Department	
Management of corporate-owned properties and forests	
-- Affiliated Corporations Division	
Management of other group companies than the Companies and Divisions above	

Basic Policy for Environmental Conservation

Corporate Policy

Mitsubishi Materials' basic policy for environmental conservation is stipulated in the Mitsubishi Materials Group's Code of Conduct ("For People, Society, and the Earth"), Ten-Chapter Action Guidelines, and in greater detail in Mitsubishi Materials Environmental Policy.

For People, Society, and the Earth

As a comprehensive materials manufacturer, we at Mitsubishi Materials not only supply a range of raw materials essential to the functioning of our society but we are also making our efforts to develop a society in which our lives are more fulfilling.
Our businesses are becoming ever more expansive, from key materials, high-performance processed products, and new materials, to systems and engineering.
Thus, with the aim of satisfying the diverse needs of society, we are committed to carrying out research and development of innovative technologies and products as well as making a variety of systems and services available.
We continue to strive to meet the needs of the new age, namely, more advanced computerization driven by cutting-edge technologies, globalization, and a higher awareness of environmental conservation.
We also aim to create a recycling-oriented society, focusing on considerate use, recycling, and the reuse of resources and materials, which are nature's gifts.
We would like our extensive business activities to contribute to people, society, and by extension, the Earth.

Ten-Chapter Action Guidelines

Chapter 6:	We will comply with laws and regulations and carry out fair corporate activities based on common-sense.

-- We will comply fully with all relevant laws and regulations.
We will focus on fairness and moderation in our business activities in compliance with the relevant laws and regulations, while basing the actions we take on common-sense. If any situation that defies common-sense or any illegal action caused by or related to our business activities comes to our notice, we will take immediate action to rectify the situation.

Chapter 8:	We will strive to promote environmental conservation, and the efficient use and recycling of resources.

-- We will strive to promote environmental conservation.
In our domestic and overseas operations, we will always comply with environmental standards provided in the laws and regulations of the countries in which we do business, and make every effort to prevent pollution. We voluntarily and constantly act on issues such as reducing the environmental impact of our products, conserving resources and energy, and reducing and recycling waste in all stages of our business activities.
-- We aim to create a recycling-oriented society.
Recognizing that environmental conservation is a global issue and that the Mitsubishi Materials Group ' s business operations are closely involved in this issue, we aim to carry out our business activities in harmony with nature.
We want to uphold the concept of a society that recycles and reuses its resources and materials, which are nature ' s gifts, rather than a one-way consumption-oriented society that exploits, processes, consumes and disposes of natural resources. Based on this concept, we will make use of our technologies and facilities to engage enthusiastically in recycling waste into useful resources.

Mitsubishi Materials Environmental Policy

At Mitsubishi Materials we are committed to tackling the major issues such as conserving and improving the environment. We are dedicated to developing an advanced resource recycling society, aimed at sustainable development through the supply and recycling of materials essential for our daily lives.
As a comprehensive materials manufacturer, Mitsubishi Materials supplys a variety of key materials essential for industrial society. Our expertise covers the manufacturing and processing of key materials such as cement, aluminum, copper, and powder metallurgy products and tools, and the supply of cutting-edge products, energy sources, high-performance materials, precious metals, and silicon.
These products and materials are indispensable in many areas of our daily lives.
Although in the materials business we produce a higher environmental impact during the manufacturing process, at the same time we can contribute to recycling resources at the waste disposal stage.
We are committed to creating an environment-friendly recycling-oriented society through our efforts for environmental conservation and the efficient use of resources in our business activities.
To this end, centered around our green productivity management (GPM) activities, we are committed to the following activities.
Specific measures:

1. Environment-conscious production and reduced environmental impact: Energy and resource conservation, reduced amounts of waste and toxic substances
2. Recycling and recirculation of resources: Waste recovery, and expansion of the waste treatment business
3. Development of eco-friendly products
4. Promotion of green procurement
5. Fostering of environmental management systems
   (1) Complying with environment-related laws and regulations and efforts to prevent pollution
   (2) Periodically reviewing matters to be dealt with and targets for constant improvement
   (3) Improving communications with communities on environmental issues
   (4) Making our policy known to all our employees and introducing environmental programs

March 23, 2005
Koichi Kitamura
Managing Director and Chief Green Officer (CGO)

Joining the ICMM

The International Council on Mining & Metals (ICMM) was established in 2001 by 15 world-leaders in the mining and refining industry. It started activities based on the belief that, in moving towards sustainable development, particularly in economic terms, collective efforts by the mining, minerals, and metals industry as a whole is the best way to deal with diverse environmental issues, including those involving regional communities. Mitsubishi Materials became a member of the ICMM in July 2002. In May 2003, the ICMM Council approved the set of principles below, which set out a more specific approach.
We will continue to actively participate in this program as a member of global society.

The ICMM Principles

As members of the International Council on Mining & Metals (ICMM) or as companies that have otherwise agreed to take on the same performance obligations as ICMM members, we seek continual improvement in our performance and contribution to sustainable development so as to enhance shareholder value. In striving to achieve this, we will:

1. Implement and maintain ethical business practices and sound systems of corporate governance.
2. Integrate sustainable development considerations within the corporate decision-making process.
3. Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by our activities.
4. Implement risk management strategies based on valid data and sound science.
5. Seek continual improvement of our health and safety performance.
6. Seek continual improvement of our environmental performance.
7. Contribute to conservation of biodiversity and integrated approaches to land use planning.
8. Facilitate and encourage responsible product design, use, re-use, recycling and disposal of our products.
9. Contribute to the social, economic and institutional development of the communities in which we operate.
10. Implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders.

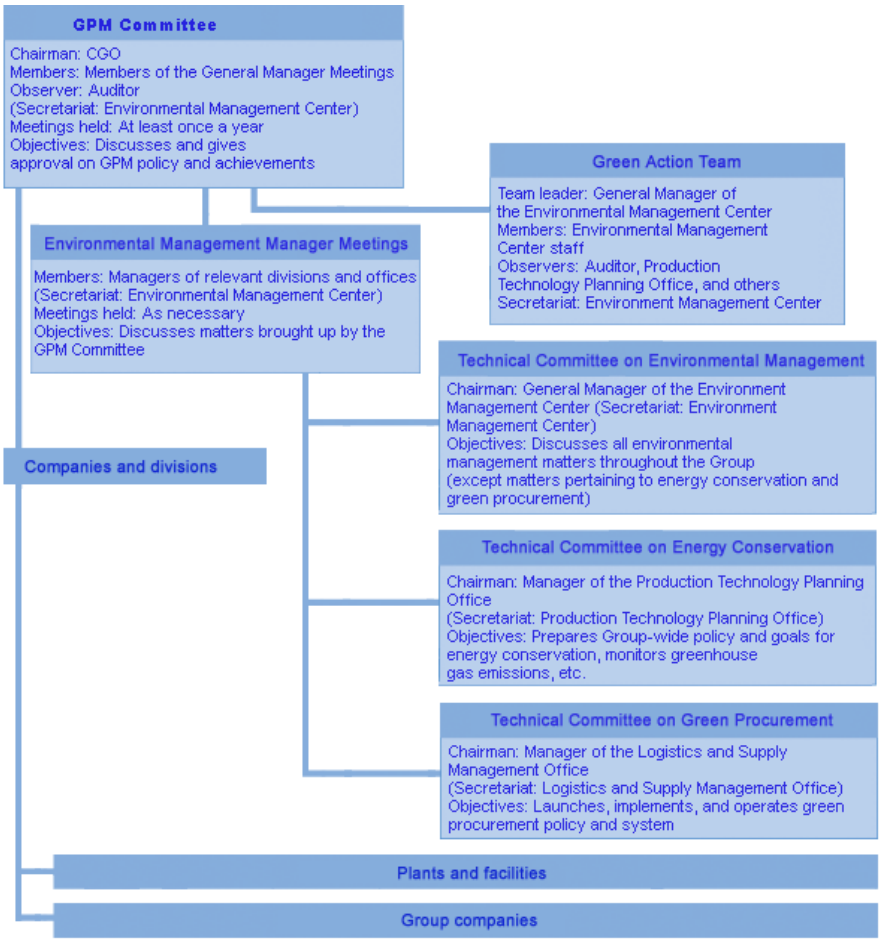
Organizations Concerned with Environmental Conservation

Summary of the Organizations

Mitsubishi Materials established the GPM Committee (chaired by the CGO) to promote environmental conservation activities throughout the Mitsubishi Materials Group as well as the Committee for Nuclear Safety Measures (chaired by the President) so that we can manage our energy needs appropriately. To strengthen our scheme in terms of risk management and legal compliance, we established the Risk Management Committee and the Corporate Ethics and Compliance Management Committee on December 1, 2004.

GPM Committee

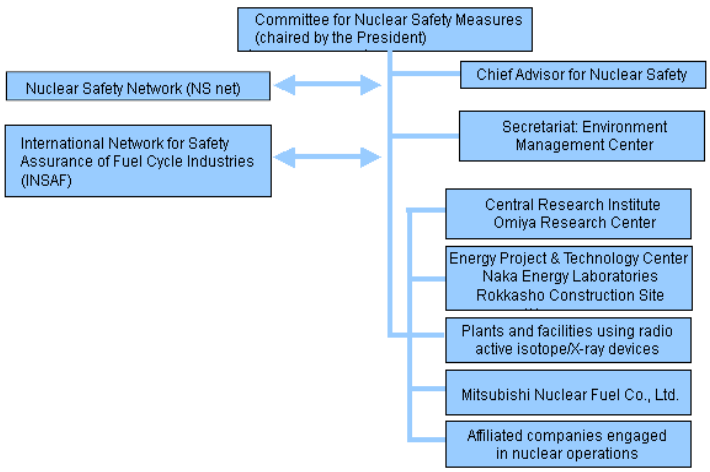
The GPM Committee was established in July 1998 to discuss and make decisions on important environmental issues related to Mitsubishi Materials. Under this Committee, we set up Environmental Management Manager Meetings for liaison and coordination among our businesses and technical committees under the relevant themes. As of December 2004, we deal with a variety of issues on environmental management and resource conservation, energy conservation, and green procurement in the relevant technical committees.
Our Green Action Team watches how our plants and facilities engage in GPM activities so that we are able to review the current situation and make improvements where required to reach our targets.



GPM Organization Chart

Committee for Nuclear Safety Measures

Mitsubishi Materials and its group companies are jointly engaged in nuclear fuel manufacturing, the nuclear fuel cycle business, and relevant research and development projects. Because of the fact that Mitsubishi Nuclear Fuel Co., Ltd., one of the group companies, manufactures fuel for nuclear power plants and to further improve safety management, a Committee for Nuclear Safety Measures was established in February 1999 chaired by the President. The committee appoints Chief Advisor for Nuclear Safety and gives periodic audits on the plants and facilities in terms of the safety and soundness of operations using nuclear fuel.
While participating in the Nuclear Safety Network (NS net), a domestic nuclear safety network, for mutual evaluation among members, we serve as the secretariat of the International Network for Safety Assurance of Fuel Cycle Industries (INSAF) (with members from 11 countries and 14 organizations) to promote nuclear safety management.



Nuclear Safety Management System of the Mitsubishi Materials Group

Summary of Environmental Conservation Activities

Summary of GPM Activities (description of activities and goals)

At Mitsubishi Materials we set corporate goals for green productivity management (GPM) to be achieved by the end of fiscal 2001. They were a 30% reduction in final waste disposal (compared to fiscal 1997) and an annual 1% reduction in the basic energy unit (compared to the previous year); all our goals were ultimately attained. By March 2002, we achieved significant results in reducing the environmental impact caused by our business activities by introducing an environmental management system at our production facilities as well as through acquisition of ISO14001 certification.

Being a comprehensive materials manufacturer, the types of environmental impact generated are as extensive as the materials and products we produce. For effective reduction of environmental impact, it is essential that our plants and facilities introduce their own customized solutions. We especially encourage our plants and facilities to make autonomous efforts in GPM activities according to the agenda shown below. Their efforts and achievements are periodically evaluated and directives are given by the GPM Committee for continuous improvement.

GPM Goals

1. Promote environmental management

    1. Develop GPM activities among group companies (encourage them to set goals customized for their own specific business activities)
    2. Promote environmental audits and expand the coverage (to all group companies)

2. Reduce environmental impact in business activities

    1. Encourage clean production and reduction of environmental impact
    2. Reduce discharge of toxic chemicals
    3. Promote green procurement

3. Promote waste recycling

    1. Reduce waste production and increase resource recovery throughout the Mitsubishi Materials Group
    2. Promote the waste treatment business

4. Matters that need further development

    1. Encourage group companies to acquire ISO 14001 certification
    2. Develop and improve internal environmental education programs
    3. Periodically publish environmental reports
    4. Share environmental information inside the corporation
    5. Promote environmental communications
    6. Monitor greenhouse gas emissions and take countermeasures to reduce them
    7. Promote energy conservation activities
    8. Create and maintain forests and other greening programs
    9. Develop eco-friendly products
    10. Consider the introduction of environmental accounting
    11. Quantitatively analyze the environmental impact of our products

Introduction of the Environmental Management System at Plants and Facilities

Mitsubishi Materials has been concentrating on the introduction of an environmental management system as the focus of our GPM activities. By the end of March, 2004, we satisfied the environmental management standard for ISO14001 (JISQ14001) certification and now maintain and update the certification for 23 of Mitsubishi Materials ’ plants, facilities, and centers (except for its Headquarters, branches, the Ikuno Plant, and Central Research Institute) as well as for 30 plants and facilities at group companies

Management of Dormant and Abandoned Mines

We are required to manage environmental needs at the nonferrous mines that we used to work, being responsible for all appropriate treatment at the mining sites even after they have closed. This includes treating water discharged from the mines that contains heavy metals, as well as of mining waste tips. Personnel are assigned to 13 dormant and abandoned mines for on-site monitoring.
We entrust treatment of mine drainage for some mines to the Center for Eco-Mining, an organization designated by the Minister of Economy, Trade and Industry for the prevention of mining-related pollution.

Achievements in Environmental Conservation Activities in Fiscal 2003

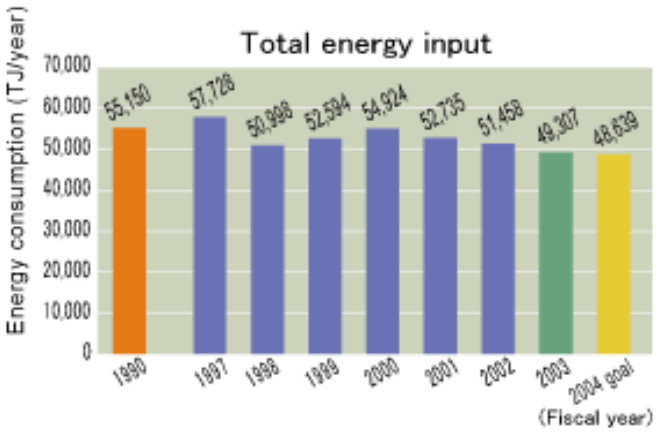
Use of Resources (raw materials, recycled materials, energy, and water)

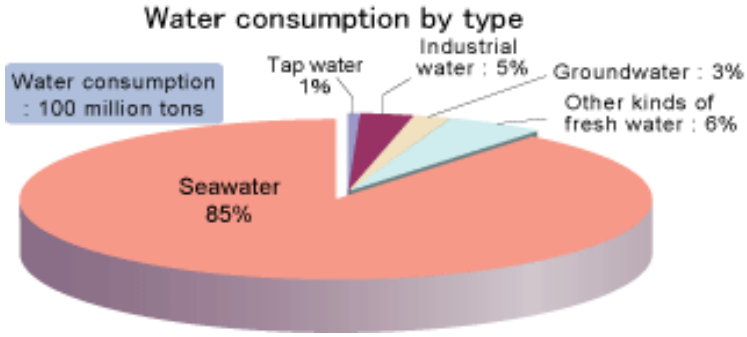
Raw material input

In fiscal 2003, Mitsubishi Materials consumed 17.93 million tons of raw and processed materials (except fuel) in the manufacture of cement products, copper products, aluminum cans, and other materials and products. Of this, 1.82 tons of the input (about 10% of the total input) was derived from waste. We enthusiastically promote the use of recycled materials to save energy and mineral resources as well as to alleviate the shortage of waste disposal sites.

Energy use

In fiscal 2003, we consumed 49,307 TJ (1 tera joule = 10^{12} J) of energy, which is equivalent to 1.29 million kiloliters of crude oil, a 10.6% reduction compared to fiscal 1990. We set the goal for fiscal 2004 at a reduction of around 12% over fiscal 1990. We also set the goal for a reduction in energy consumption per product by more than 1% over the previous year, in line with to the Law Concerning the Rational Use of Energy.





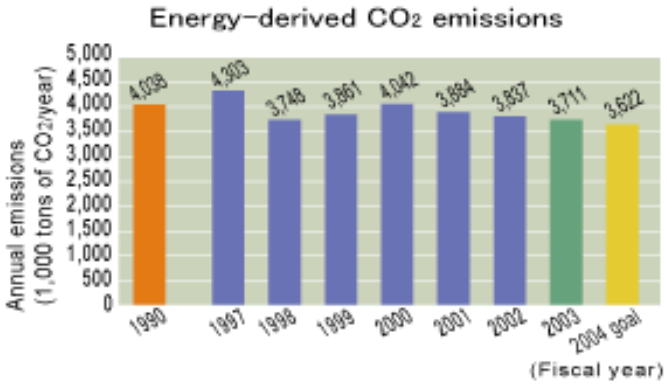
Water use

In fiscal 2003, we consumed 15.35 million tons of fresh water including tap water, industrial water, and ground water as well as 82.64 million tons of seawater. We will continue all-out efforts to recirculate water and to make use of closed systems to save water resources and use them more efficiently.

Waste Discharge and Emissions

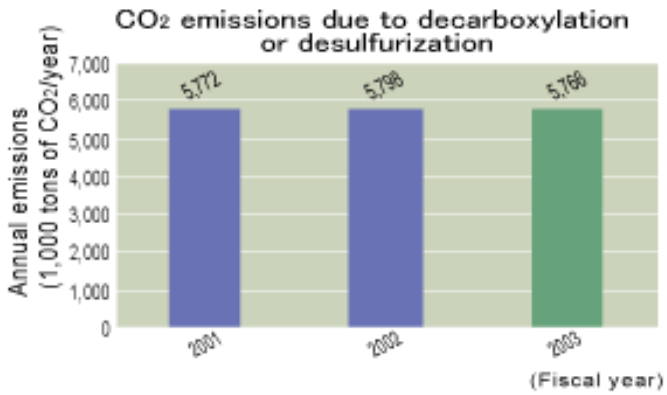
Greenhouse gas emissions

In fiscal 2003, energy-derived CO_2 emissions reached 3.71 million tons. However, as the result of a wide range of efforts, this was a reduction of 8.1% from fiscal 1990. The target for fiscal 2004 is 3.62 million tons (a 10.3% decrease).
During the manufacturing of cement and the refining of copper, both of which are our key businesses, a certain amount of CO_2 is emitted during the chemical reaction. Emissions in fiscal 2003 reached 5.77 million tons. Together with energy-derived CO_2 emission, total emissions were 9.48 million tons.



Use and emissions of ozone-depleting substances

We do not use ozone-depleting substances except as refrigerant for cooling devices. The devices in use are under strict control, and when they reach the end of their useful lives, they will be collected properly and replaced by models that do not use ozone-depleting substances.



Emissions/discharge into the air and water

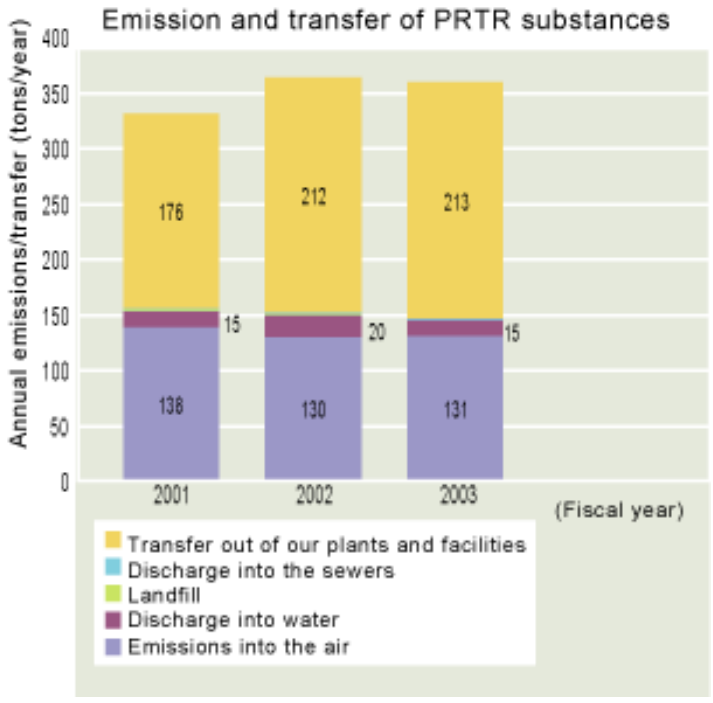
Major environmental impact of chemical emissions/discharge into the air and water are as follows:

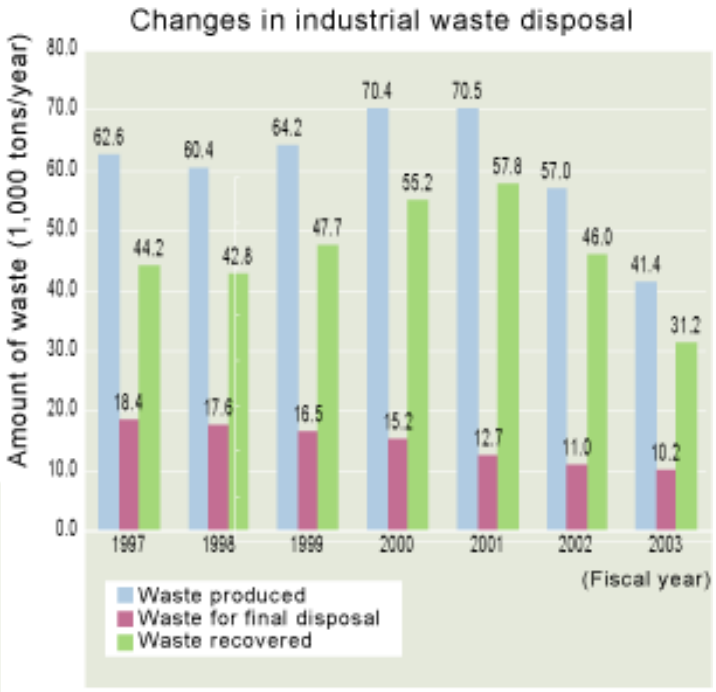
- NOx emissions: 6.11 million Nm^3/year
- SOx emissions: 0.32 million Nm^3/year
- Chemical oxygen demand (COD) discharged into water: 147 tons/year
- Nitrogen discharged into water: 19 tons/year
- Phosphorus discharged into water: 126 tons/year

Substances discharged	Units	Fiscal 2002	Fiscal 2003	Year-on-year change (%)
SOx	10,000 Nm^3	730	611	83.70%
NOx	10,000 Nm^3	33	32	97.70%
COD	Tons	142	147	103.30%
Nitrogen	Tons	18	19	104.20%
Phosphorus	Tons	153	126	82.10%

PRTR substances

In fiscal 2003, chemicals (PRTR substances) emitted or transported at 16 plants and facilities for which Mitsubishi Materials is directly responsible totaled 359 tons, a 1.2% decrease over the previous year.
More specifically, emissions into the air including dichloromethane and toluene totaled 131 tons, discharge into water including heavy metals totaled 15 tons, and the transfer of waste out of our plants and facilities for collection, processing, or final disposal totaled about 213 tons. Emissions and transfer of dioxin showed a decrease of 97% (5mg-TEQ/year) over the previous year due to the discontinued use of more small incinerators. Amounts of PRTR substances buried in landfill or discharged into the sewers were less than one ton in either case.
We are making as much effort as we can to reduce overall PRTR substance emissions from our facilities, following the framework of their respective environmental management systems. The efforts include reduced use of PRTR substances, use of substitutes, and thorough management.





Waste disposal and recycling

In fiscal 2003, the amount of waste we produced totaled 40,000 tons, a 27% decrease over the previous year, due to more eager involvement by our plants and facilities in dealing with this issue. Out of this amount, waste not recycled but disposed of in landfill was 10,000 tons, showing a 7.2% decrease.
Compared to fiscal 1997 when Mitsubishi Materials first set goals for waste reduction, we achieved a 33.8% reduction in waste production and a 44.6% reduction in final disposal of waste.
We turn waste into resources within our own organization, and at the same time take the relevant measures to reduce waste at our individual plants and facilities in line with their environmental management systems. We will continue to strive for further reductions in and pay keener attention to waste disposal and recycling.

Eco-friendly Logistics

It is extremely important to streamline logistics systems in terms of tackling diverse environmental issues, namely, the prevention of global warming, efficient use of energy and resources, and control of air pollution. Because of the significant distances involved and the amounts of raw materials and finished products that we must transport, we plan to draw up a corporate-wide Green Logistics Guidelines to comprehensively reduce the environmental impact from logistics of the diverse range of materials and products that we handle. With these guidelines, we will continue to strive to streamline our logistics system, to carefully select eco-friendly packaging materials, to put the emphasis on legal compliance during transportation, and to make further efforts for recycling.

Environmental information website

Sharing Environmental Information

In April 2003, with the aim of encouraging our employees to share environmental information internally, we launched a website that provides environmental information for internal use. It is expected to improve the environmental management system as well as promote employees' awareness of environmental conservation.

Progress on Major Environmental Issues

In fiscal 2003, during the period covered by this Environmental Report, we experienced no significant leakage accidents. However, during the same period of time, there were 45 cases that provoked complaints from the local community or needed on-site improvements as determined by our plants and facilities. Five cases were concerning air pollution and offensive odors, 18 concerning water pollution, 14 concerning noise and vibration, and eight other complaints. At all plants and facilities of Mitsubishi Materials, we take immediate and appropriate action to discover the cause of the problem, put countermeasures into effect, and prevent any recurrence of the problem. We welcome opinions and complaints from community residents and all other persons concerned and treat them as valuable information needed for improvement.

<Soil remediation on the site of the Omiya Research Center at the Central Research Institute>
In 2000, we discovered that groundwater under the Central Research Institute site (Saitama City, Saitama) and in its vicinity was contaminated with heavy metals. We promptly took emergency measures to prevent the spread of contamination to the surrounding areas, and are now working on permanent solutions for soil remediation. In February 2004, we started an in-situ remediation solution on the Institute site.

<Environmental conservation on the site for the former nuclear fuel experiment and research institute at the Omiya Research Center, Central Research Institute>
Following the dismantling of the site of the former nuclear fuel experiment and research institute at the Central Research Institute (Saitama City, Saitama), we are working on collecting waste from the underground installation, and dismantling and removing contaminated experimental structures. The uranium-contaminated structures collected were identified as radioactive waste, and underground storage for these will be completed by March 2005. In July 2004, 21 glass bottles containing radioactive substances were discovered from the institute building. Those bottles were promptly removed for safe storage, and we have confirmed that there are no other suspicious substances. Radioactive monitoring of the soil will continue for the entire institute site.

<Groundwater purification at the Okegawa Plant>
In 1999, trichloroethylene and tetrachloroethylene in amounts exceeding the environmental standards were detected from the soil and groundwater at the Okegawa Plant site (Okegawa City, Saitama). We are continuing our efforts to purify the groundwater by pumping and aeration.

<Soil and water environment at the Osaka Amenity Park (OAP)>
Regarding the development of the Osaka Amenity Park (OAP), we took the then best possible countermeasures against soil pollution. However, heavy metals were detected in the water inflow to the underground structures in 1997, and we made the fact public in 2002. Since then, we have surveyed the soil surface in line with the Soil Contamination Countermeasures Law and have taken relevant measures based on the opinions of experts. In 2004, however, the heavy rains from Typhoon Tokage caused water to leak into the basement parking garage, which led to a warning from Osaka City against a violation of the sewerage ordinance.
We are taking prompt action in this matter and continue our efforts towards finding a solution through discussions with the persons concerned and by conducting surveys to determine the causes.
In addition, we take seriously the investigation by the Osaka Police Department into a suspicious violation of the Building Lots and Buildings Transaction Business Law, and are ready to cooperate fully with the investigation.

<Survey results for titanium ore surplus soil>
In 2003, at the request of Akita Prefecture, a radiation dose survey was conducted on surplus soil from a landfill, for which safety had been confirmed. However, no anomalies were observed.

<Completed disposal of the contaminated soil stored by Hosokura Mining>
The soil, which was displaced during the construction of the Central Research Institute and which turned out to be contaminated by selenium and other substances, was removed from the Irigamazawa tailing dam site of Hosokura Mining Co., Ltd. (Uguisuzawa-Cho, Miyagi) and stored by Mitsubishi Materials. Afterwards, the contaminated soil was transferred to the Hanaoka Mining Co., Ltd. (Odate City, Akita) for disposal, which started on November 24, 2004, and was completed on December 1, 2004.

< Expansion of the Hosokura Environmental Research Center, Central Research Institute>
In October 2003, the Hosokura Environmental Research Center was established within Hosokura Mining Co., Ltd., aimed at the development of technologies directly contributing to community environmental conservation. With the cooperation of Uguisuzawa-Cho, the center was transferred to the former site of the Hosokura Elementary School, allowing for further expansion and development.

Generation of Renewable Energy

Geothermal/hydraulic power generation is estimated to emit less CO_2> than petroleum power generation by about 0.7kg per 1kWh throughout its life cycle (Source: Central Research Institute of the Electric Power Industry, March 2000). Mitsubishi Materials generated about 565 million kWh from geothermal/hydraulic power sources (including steam supply) in fiscal 2003. Compared to generation of the same amount of power by petroleum fuel, this is equivalent to an annual reduction of about 400,000 tons of CO_2 emissions. Although the annual power generation may fluctuate for a variety of reasons, including whether routine checkups are conducted or not, we believe that we are able to continue annual CO_2 emission reductions of 350,000 tons or more.

Annual power generation results using renewable energy (MWh)

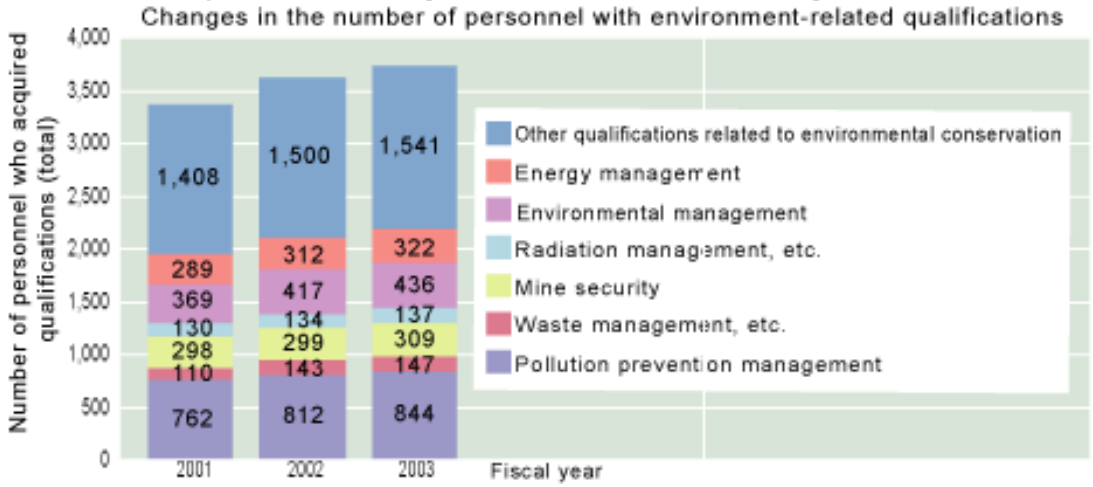
Fiscal year	Geothermal power generation (Onuma Geothermal Power Plant)	Geothermal power generation (steam supply; Sumikawa Geothermal Power Plant)	Hydraulic power generation (Kazuno/Komata river systems)	Total
2000	53,246	326,547	89,231	469,024
2001	53,571	371,122	87,162	511,855
2002	52,862	353,161	85,849	491,872
2003	55,041	424,105	86,118	565,264

Reductions in CO_2 emissions compared to petroleum power generation (10,000 tons)
34.1
37.3
35.8
41.1

Environmental Education for Our Employees

As a part of our environmental conservation activities, we consider it important for our employees to be environmentally-conscious in their routine work so that they may deal voluntarily with environmental issues. To this end, we provide not only training programs at individual plants and facilities based on their environmental management systems, but also environmental education on various occasions such as internal educational programs at Headquarters and regular meetings in the workplace. As a part of promoting awareness amongst our employees, we encourage them to acquire environment-related qualifications. The number of employees who acquired qualifications totaled 3,736 at the end of fiscal 2003, which was an increase of 119 employees over the previous year.

Changes in the number of personnel with environment-related qualifications



Conservation of the Ecosystem

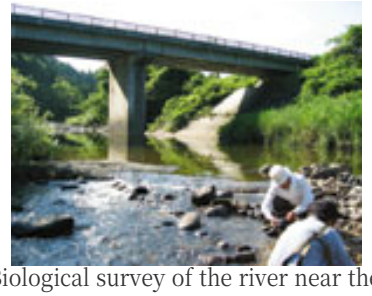
Ecosystem survey around the Hosokura Mine

To protect the natural environment in the vicinity of the mine, the Hosokura Environmental Research Center at the Central Research Institute conducts surveys on the forest vegetation and habitation of aquatic organisms in the vicinity of the mine. Past surveys include one on the current biological situation typical of ore deposits around the Hosokura Mine in northern Miyagi. Accordingly, we continuously monitor and evaluate progress in restoring the regional environment based on our achievements in preventing mine pollution and planting trees at dormant and abandoned mines. We then use the results to provide useful information and technical assistance for future environmental conservation efforts.

Afforestation around the Naoshima Smelter & Refinery

Long-term refining operations at our Naoshima Smelter & Refinery have no doubt affected the surrounding vegetation. We take the problem seriously, and have been planting trees over an area of 4 ha or more every year, including fiscal 2003. We are continuing our efforts, having expanded the target area to 5 ha or more from fiscal 2004 to accelerate afforestation.
In April 2003, in order to reinstate a forest burnt down in a forest fire that broke out on a neighboring uninhabited island, a total of 500 employees volunteered to participate in tree planting. In April 2004, 700 employees joined in these activities again.

Forest vegetation survey (Hosokura, Miyagi)



Biological survey of the river near the mine (Hosokura, Miyagi)

Forest management in Mitsubishi Materials

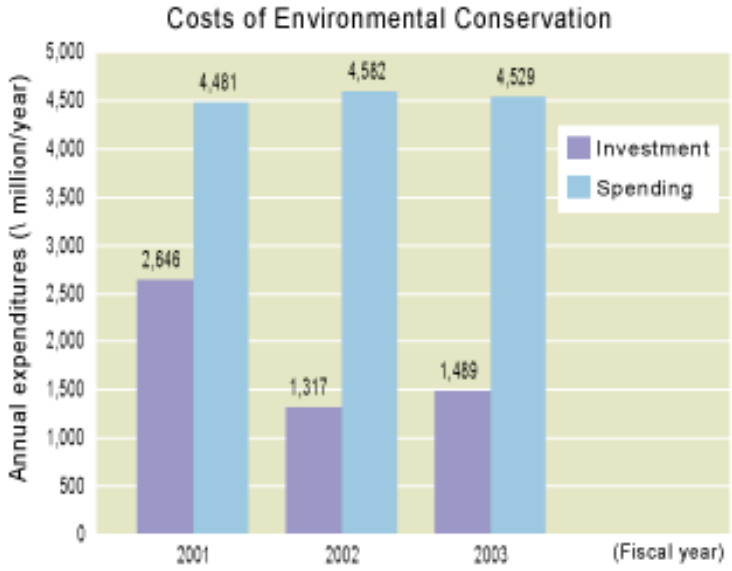
Forests are involved in a variety of functions including land conservation, provision of water resources, public health care, and recreation. These days, their ability to absorb CO_2 is attracting more attention in the drive to prevent global warming. It is therefore vital for us to make efforts to achieve our international commitment on climate change under the Kyoto Protocol.
Our forest management activities were started up in order to produce timber for use at the mineral and coal mines owned by Mitsubishi Mining Co., Ltd., the predecessor of the present Mitsubishi Materials. The closing of those mines marked the end of the timber supply. However, a recent survey indicated that most forest ecosystems in Japan are maintaining their capacities through recurrent use. Forests can play a significant role for us to achieve a sustainable society, and at Mitsubishi Materials we are pursuing new ways of involvement with and utilization of forests. Forests created and maintained by Mitsubishi Materials totaled 631 ha in fiscal 2002, 453 ha in fiscal 2003, and about 500 ha (planned) in fiscal 2004.

Reforestation after a forest fire
(Naoshima, Kagawa)

Forest under our management
(Makimine, Miyazaki)

Costs of Environmental Conservation

Based on the environmental accounting guidelines set by the Ministry of Environment, at Mitsubishi Materials we separately calculate the amounts of investments and spending for each item listed in the table below. In fiscal 2003, our total expenditures on environmental conservation reached \6.02 billion. We achieved a significant decrease over the previous year in upstream/downstream costs (e.g. resource recovery and recycling) and social contribution costs (e.g. tree planting/afforestation).



Costs of Environmental Conservation in Fiscal 2003

(¥million)

		Investment	Spending	Total
Business area costs	Pollution prevention	588	1,189	1,777
	Global environmental conservation	37	15	53
	Resource recycling	786	2,418	3,203
Upstream/downstream costs		37	208	245
Management costs		9	83	92
Research and development costs		27	42	69
Social contribution costs		4	407	412
Environmental remedial costs		0	167	167
Total		1,489	4,529	6,019

Environmental conservation activities for the community

At Mitsubishi Materials we encourage our plants and facilities to engage in environmental conservation activities that contribute to the communities in which they are located. Major achievements in fiscal 2003 are as follows, and we are continuing and further developing these activities in fiscal 2004.

All-out cleanup at Mt. Fuji (Fujioyama)

<Community activities conducted by our plants and facilities (location names given in parentheses)>

- Collecting waste for recycling (Kurosaki and Kanda, Kyushu Plant)
- Participating in cleanup around the plants and facilities (Omiya Research Center, Central Research Institute; Naka Energy Laboratories, Energy Project & Technology Center; Aomori Plant; Yokoze Plant; Higashitani Mine; Kyushu Plant; Tsukuba Plant; Iwaki Plant; Yuki Plant; Fujioyama Plant; Sanda Plant; Ceramics Plant; and Okegawa Plant)
- Welcoming community residents to our plants and facilities (Aomori Plant, Yokoze Plant, Higashitani Mine, Naoshima Smelter & Refinery, Tsukuba Plant, and Okegawa Plant)
- Sharing expenses for environmental measures in the community (Naoshima Smelter & Refinery and Niigata Plant)
- Opening environmental facilities to the public as a stop on an eco-tour (Naoshima Smelter & Refinery)

Participation in ecological exhibitions

To promote public awareness of our environmental conservation efforts as well as to encourage public reaction on our efforts, we actively participate in environment-related exhibitions. Especially, as a part of our corporate-wide approach, Mitsubishi Materials has taken part in the Eco-Products exhibition held in Tokyo every year since its start in 1999. In September 2004, we participated in the Eco-Products International Fair held in Malaysia, which aimed at promoting sales of eco-friendly products and services throughout Southeast Asia.

Eco-Products International Fair

2004 Exposition for Geo-Environmental Restoration

Eco-Techno

Eco-Products 2004

<Major environment-related exhibitions we took part in>

- Eco-Products International Fair (Kuala Lumpur, September 2004)
- 2004 Exposition for Geo-Environmental Restoration (Tokyo, September 2004)
- Eco-Techno 2004 (Fukuoka, October 2004)
- Eco-Products 2004 (Tokyo, December 2004)

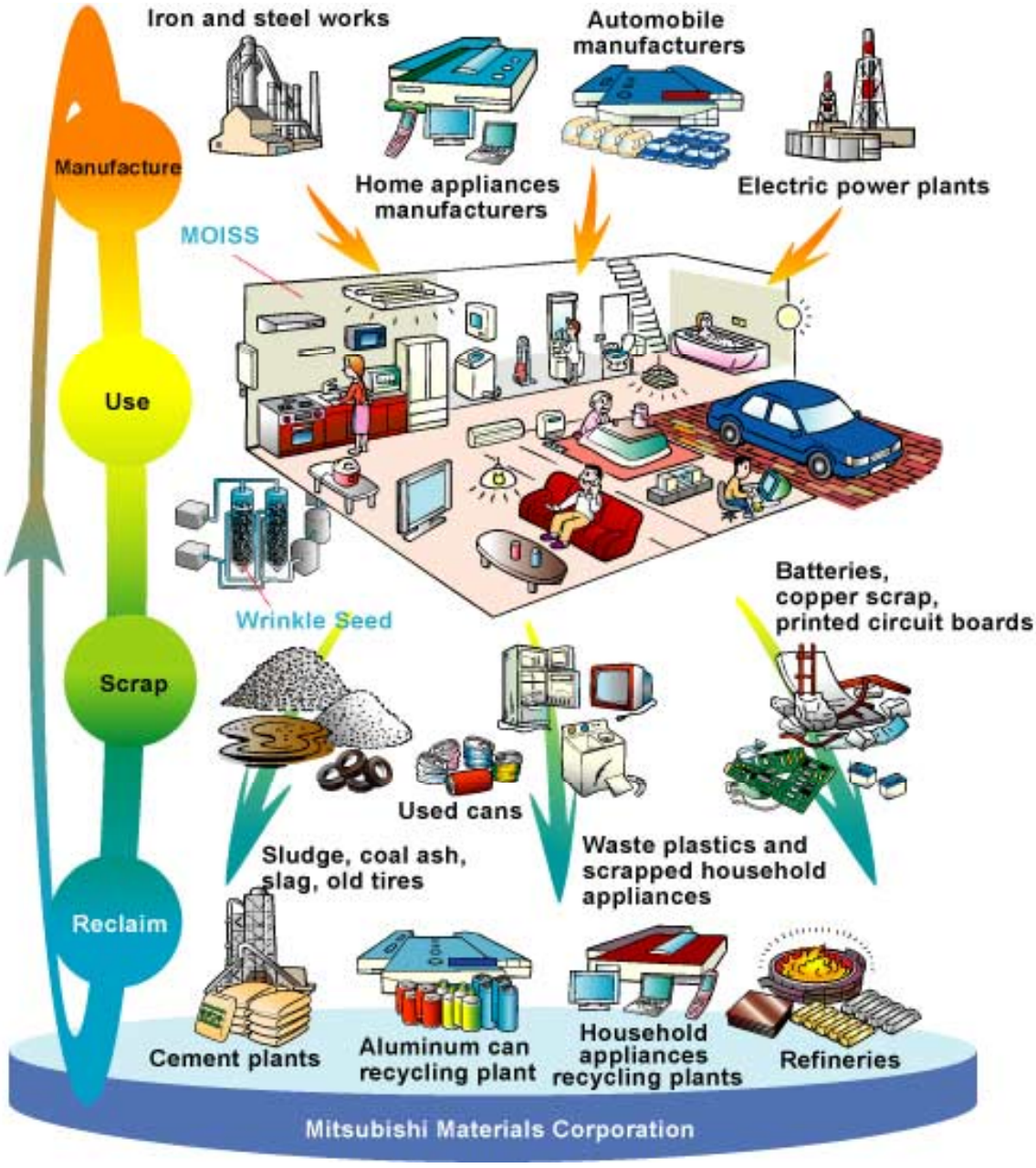
Chapter 2: Promoting a Construction of Recycling-oriented Society

Overview of Environmental Business Policies of Mitsubishi Materials Group Companies

Being a comprehensive materials manufacturer, we not only supply a variety of raw materials but also undertake an important role in supporting a recycling-oriented society. To help reduce consumption of natural resources as much as possible, we work on recovering and recycling post-consumer articles. We process used aluminum cans to recover aluminum, batteries to recover lead, and personal computers and other home appliances to recover precious metals, copper, etc.

Waste materials such as metals and the mixture of plastics and other materials (known as shredder dust) from scrapped automobiles and home appliances, and sewage sludge, can be hazardous and must be processed to make them harmless and recycled.

At our metal refineries and cement plants, we are working on reclaiming these kinds of waste materials, which were previously considered hard to dispose properly. Presented in this chapter are details of our recycling efforts along with the manufacturing process involved in the field of non-ferrous metal smelting, aluminum and cement production, home appliances recycling.



Recycling resources in cement manufacturing (Cement Company)

Over 3.6 million tons of industrial waste and byproducts from a variety of industries are efficiently utilized each year as part of cement raw materials and energy sources in our Cement Company. We have developed our unique processing systems to handle old tires, sewage sludge, waste construction soil and sludge, etc. The systems enable us to recycle a large volume of resources in a highly stable manner and help us contribute to promoting a recycling-oriented society.

Topics

Our recently-developed waste plastic processing systems have allowed us to actively seek to accept increasing amounts of used tires, plastics, oil, wood, etc., which can be efficiently utilized as fuel substitutes for coal in cement manufacturing.

Recycling processes and their features

Technology that enables us to reuse waste as raw materials and/or energy sources can help reduce our consumption of natural resources. The inorganic materials from such waste are all processed in the furnace to form clinker. Organic materials and odorous components are decomposed in a high-temperature process at 1450 ° C and rendered harmless. We are reclaiming a variety of waste materials in massive amounts under the stringent quality management system that we have in place. (See Fig. 1a and Fig. 1b.)
Presented below are some representative examples of our recycling work.
We can recycle a large quantity of waste construction soil and sludge. Our Kyushu Plant received the 2000 Award from the Construction Minister (Recycling Council) for promoting recycling. Around 80,000 tons of sewage and wastewater sludge are reclaimed each year through our Direct Sludge Processing System without any preprocessing.

Waste construction soil and sludge for processing

Sewage and wastewater sludge for processing

Old tires are utilized as a source of energy as is or after being shredded into small chips and. The steel cords in the tires are reused as raw materials for iron/steel. Waste plastics are also shredded and utilized as a source of energy.

Old tires for processing

Waste plastic for processing

Performance and achievements

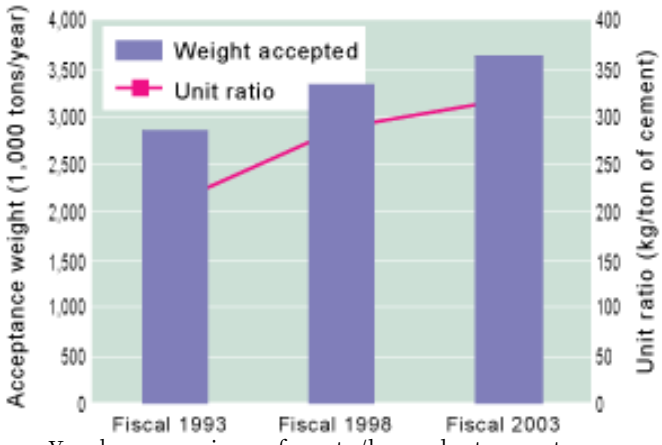
A total of 3.6 million tons of waste materials were accepted in fiscal 2003 for use in our cement manufacturing process. This means that over 300 kg of waste materials and byproducts are utilized in manufacturing one ton of cement. We are working hard to further improve our technology for efficient recycling of a variety of waste materials, based on the experience-proven cement manufacturing facilities and the calcination technologies that we already have. With these efforts we are determined to continue playing an important role as a supplier of base materials for the industries that form the arteries of our industrial society and also by actively participating in the industries that act as the veins by promoting waste recycling.

Waste and byproducts accepted at our cement plants

(1,000 tons/year)

Items	Fiscal 1993	Fiscal 1998	Fiscal 2003
Waste oil	4	5	17
Old tires	35	57	61
Blast-furnace slag	1,850	1,761	1,428
Foundry sand	30	93	61
Coal waste	316	275	230
Cinders, soot	11	70	60
Coal ash	143	341	990
Sludge	221	227	265
Byproduct gypsum	194	503	409
Waste plastics	0	3	28
Waste wood	0	0	4
Others	4	2	69
Total weight	2,808	3,337	3,622
Unit ratio (kg/ton)*	211	289	319

* Weight of waste per ton of cement



Yearly comparison of waste/byproduct acceptance

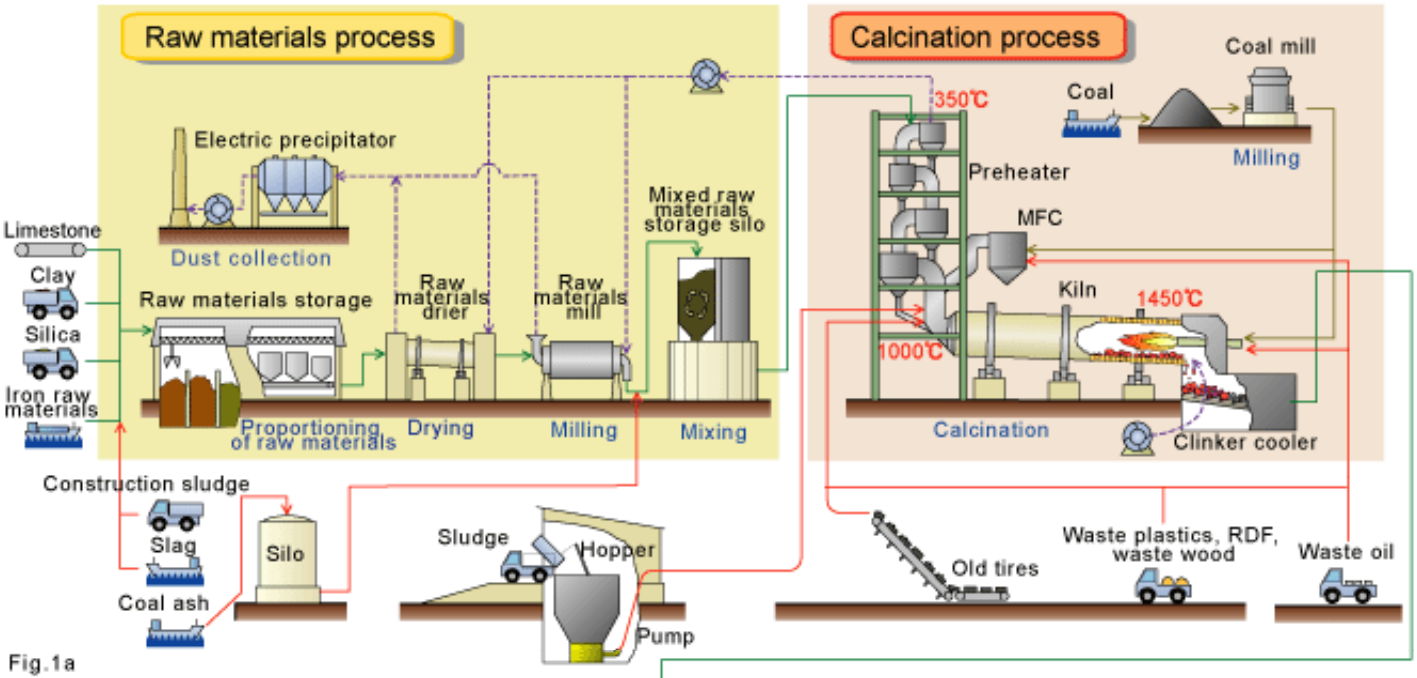


Fig.1a
Cement manufacturing process (raw materials - calcinations)

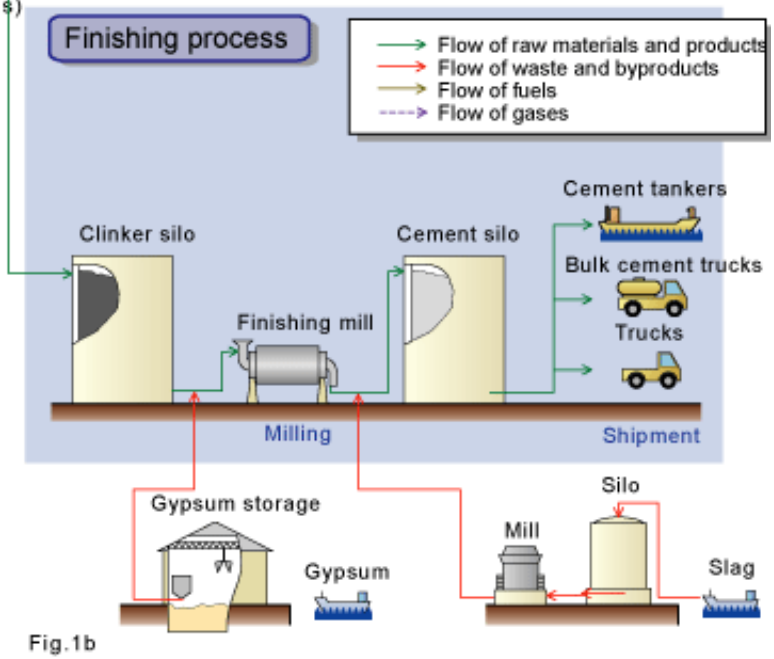


Fig.1b
Cement manufacturing process (Finishing process)

Recycling resources in aluminum manufacturing (Aluminum Company)

We have been actively involved in collecting and recycling used aluminum cans since 1975, shortly after we commenced the aluminum can manufacturing business in 1972. Over the past 29 years, we have recovered and reclaimed for use a staggering total of around 580,000 tons of used aluminum cans.

Can-to-Can recycling

Shinryo Aluminum Recycle Co. was founded in 2001 as one of our group companies, working in close collaboration with Mitsubishi Aluminum Co. and our own aluminum can manufacturing plant. This collaboration among the group companies involved makes it possible to build a complete recycling system for aluminum cans from used can collection and aluminum slab production (1) to plate rolling and coiling, and then to aluminum can manufacturing and sales. This system can provide improved efficiency in producing reclaimed aluminum material (2) from UBCs (3) for reuse in manufacturing aluminum cans. It should be noted that the energy consumed in smelting the collected cans and producing reclaimed aluminum material is extremely low at about 3% of that required to produce "new" aluminum material (4) . Our policy is therefore to minimize the use of new aluminum material by utilizing UBCs to the greatest extent possible.

(Notes)
(1) Slab: Rectangular solid aluminum ingot for rolling
(2)Reclaimed aluminum: Aluminum material reclaimed from used aluminum cans and the like
(3)UBCs: Used Beverage Cans
(4)New aluminum: Aluminum material made from bauxite ore

Integrated UBC processing system

Our aluminum can recycling flow is characterized by our unique Integrated UBC Processing System which includes a process of smelting UBCs and casting aluminum slabs, which are then rolled into plate for cans. The crushing and separation process, the burning and smelting (reclaimed aluminum production) process, and the slab casting process were carried out in three separate factories in the past. Now these processes have been integrated at one location and become more simplified. The Integrated UBC Processing System is capable of producing 60,000 tons of aluminum slab per year, reducing energy consumption and CO_2 emissions by around 30% compared to the conventional system.

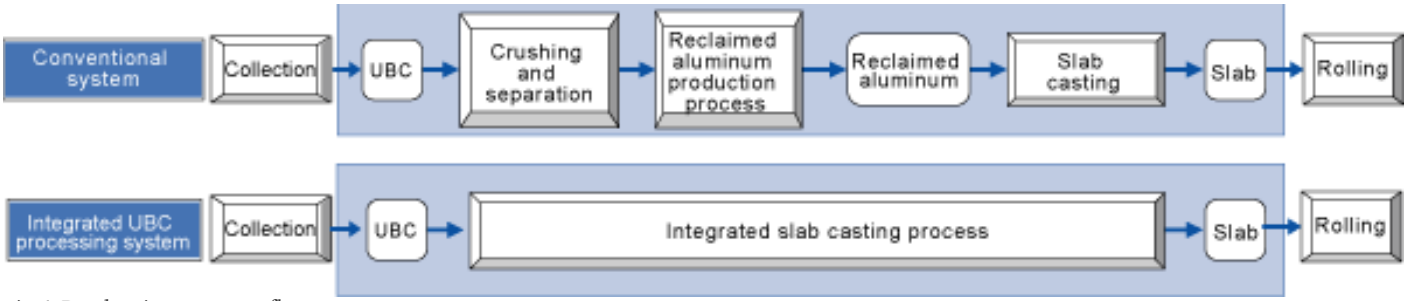


Fig.1 Production process flow

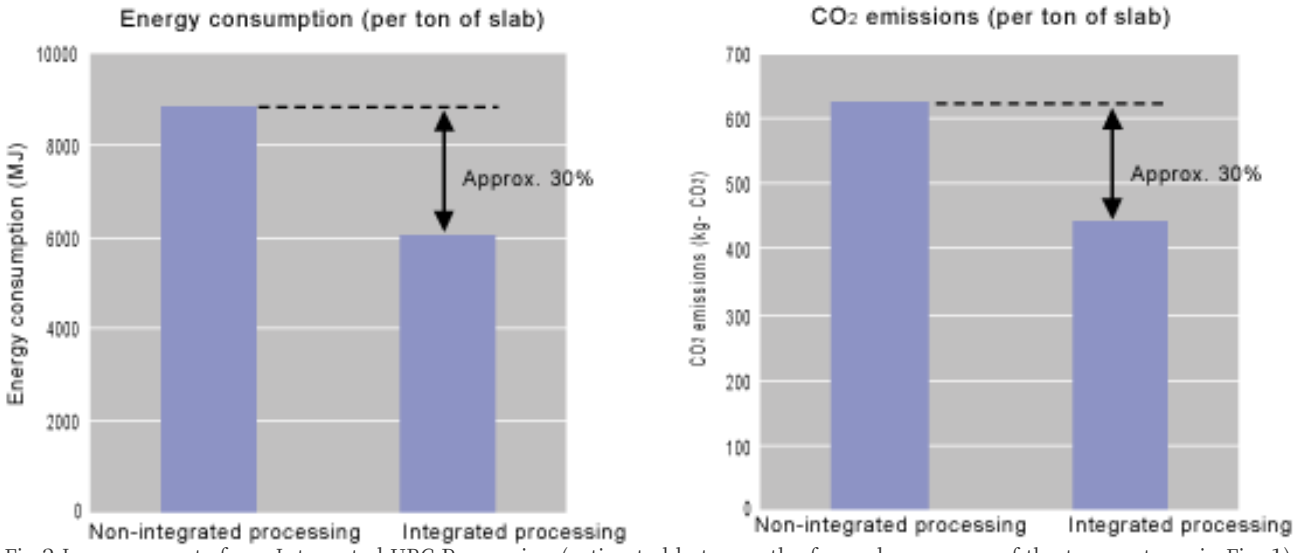


Fig.2 Improvements from Integrated UBC Processing (estimated between the framed processes of the two systems in Fig. 1)

Our recycled can material reutilization is high

Fig. 3 gives a comparison of our can material reutilization rate compared to the nationwide rate based on the data compiled by the Japan Aluminum Can Recycling Association.
The Ministry of Economy, Trade and Industry has established recycling guidelines to help business entities voluntarily promote their recycling efforts. The guidelines set the target reclaimed can material reutilization rate at 55% or higher for fiscal 2006, a figure that we have already exceeded by a large margin. Updated information on our recycling performance is available on our website: http://www.mmc.co.jp/env/.

Can material reutilization rate (%) = (Net material weight reclaimed from collected cans / Weight of used aluminum cans) x 100

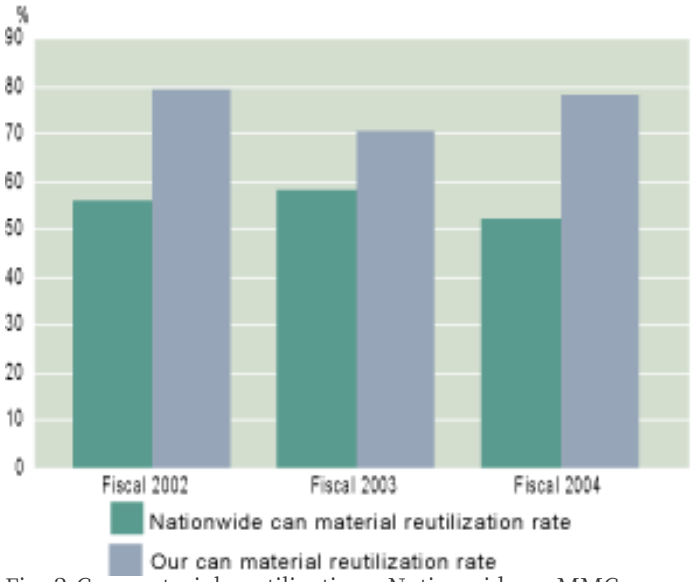


Fig. 3 Can material reutilization - Nationwide vs MMC

Performance and achievements

Fig. 4 presents the compositions of aluminum can material, with a comparison between three cases: ① MMC, ② Nationwide average [5], and ③ With no reclaimed UBCs. Fig. 5 shows energy consumption and CO_2 emissions in each case.
It is evident that our achievements based on high can material reutilization and the integrated UBC processing system are conserving energy and natural resources, and thereby reducing environmental loads including the CO_2 emissions that are thought to cause global warming.

Note 5: From "The 350-ml and 500-ml Aluminum Can Lifecycle Inventory, Rev. 2002.10" prepared by the Japan Aluminum Association

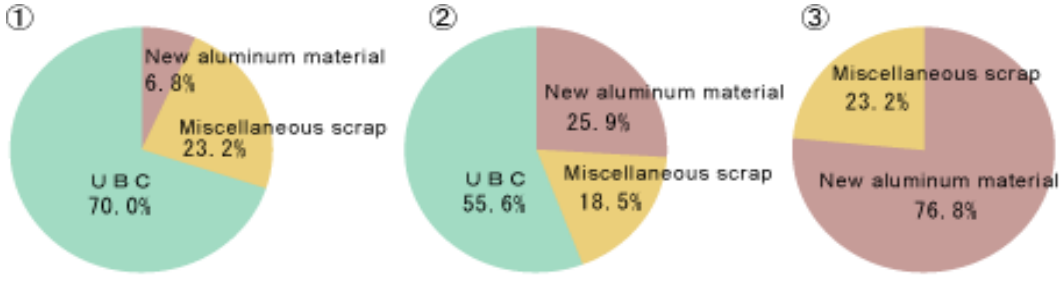


Fig. 4 Composition of aluminum can material (body)

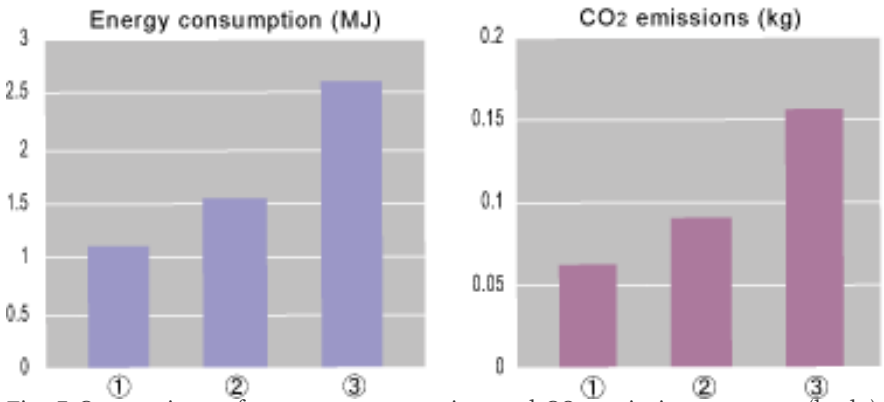


Fig. 5 Comparison of energy consumption and CO_2 emissions per can (body) (Our estimate is based on varying only the material composition)

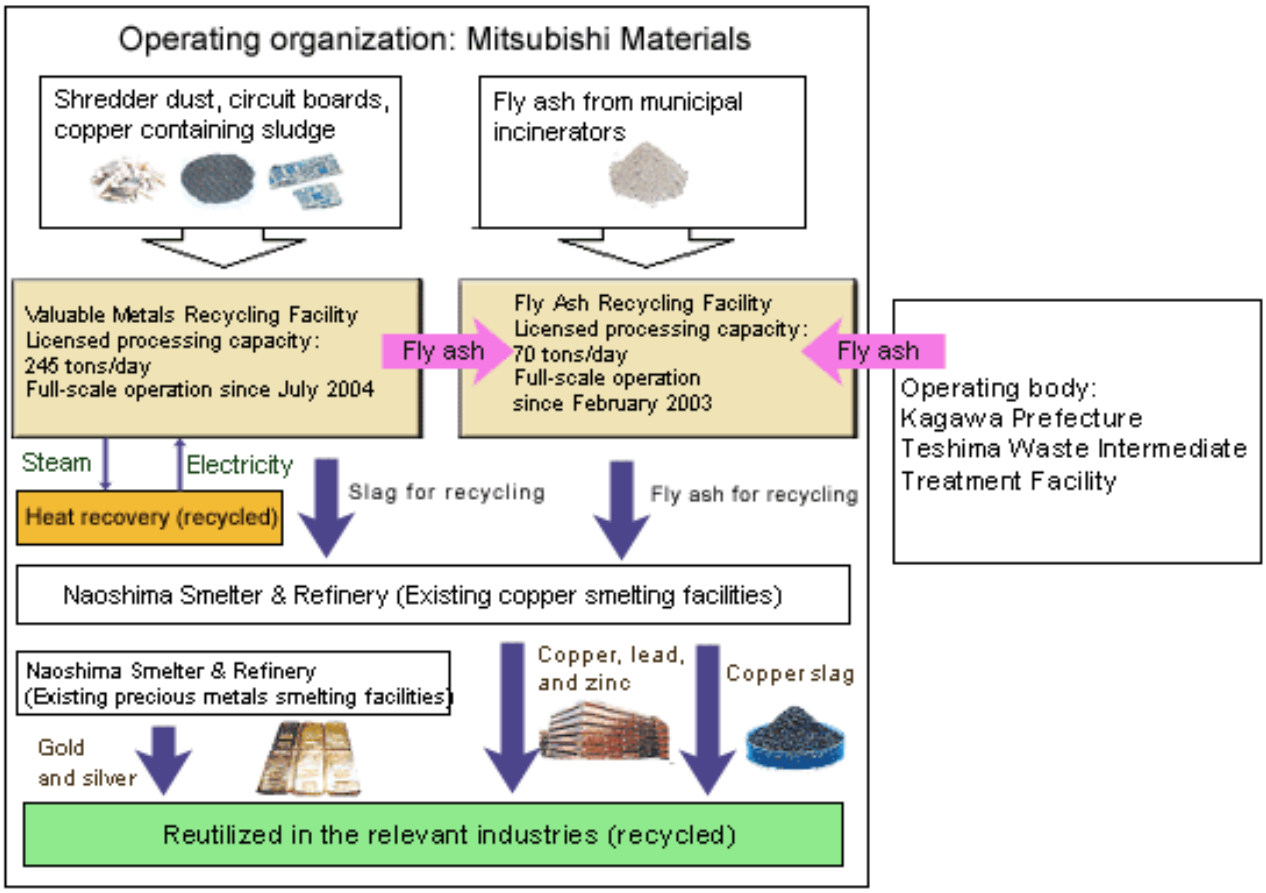
Recycling resources in copper metal production (Metals Company)

Our Metals Company is deeply involved in the resources recycling business, fully utilizing its smelting facilities and the technologies it has acquired to date. Its operations include not only the smelting of copper and precious metals, but also lead and even tin, for which it is the only smelter in the country. A variety of scrap materials are processed for smelting and recovered in the form of both primary and secondary materials. Valuable metals, such as copper, precious metals, lead, and tin, are all recovered as high-purity base metals.

The remainder of the scrap materials is recovered in the form of slag, which is used as one of the raw materials in cement, for example. Any combustible components contained in the scrap materials for copper smelting are recovered as thermal energy. This is then converted to electrical energy through an in-house power generation plant, contributing to conserving valuable fossil fuel. As described above, virtually 100% of the scrap materials, which were traditionally buried in landfills, are recovered and recycled in the form of metals and thermal energy. In this way, we are proud to be a contributing member to the creation of a recycling-oriented society.

Topics

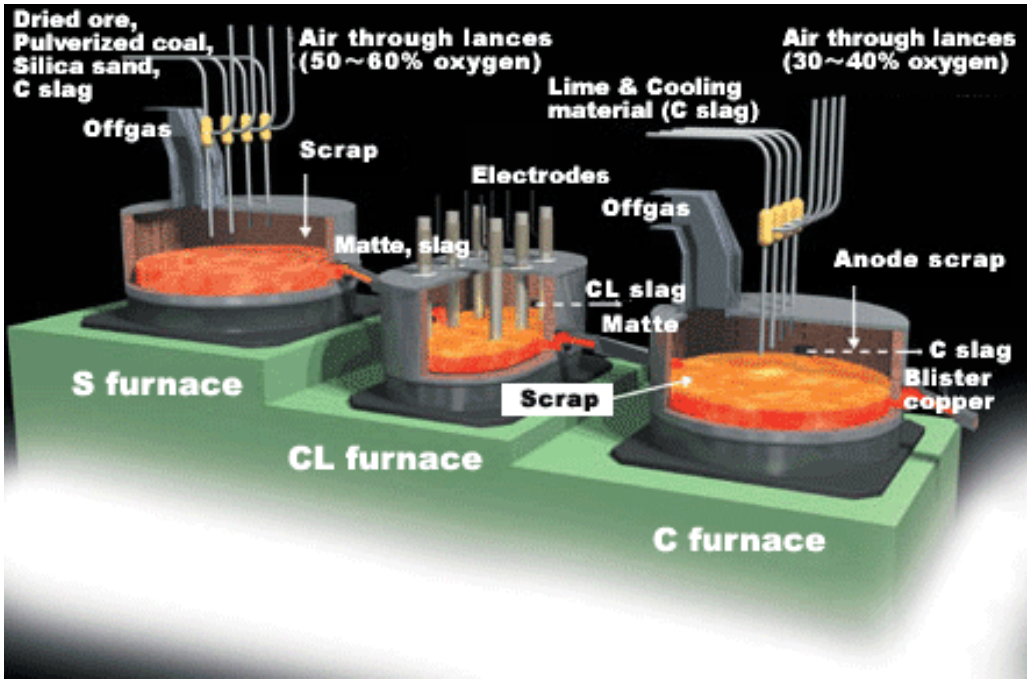
The Naoshima Eco-Town Project was started in March 2003 under Government approval within our Naoshima Smelter & Refinery, where we primarily smelt copper and precious metals. The project has been in operation on a full-scale basis since July 2004, with the facilities and processes illustrated below.



A waste treatment facility known as the Teshima Waste Intermediate Treatment Facility was built with the sponsorship of Kagawa Prefecture, on the premises of our Naoshima Smelter & Refinery, to handle a massive 500,000 tons of industrial waste illegally dumped on Teshima Island in Kagawa Prefecture. Taking advantage of that opportunity, the Naoshima Eco Town Project was also started up by Naoshima Town in collaboration with the Prefecture, with our Naoshima plant positioned as the central facility. It comprises a Fly Ash Recycling Facility which utilizes our copper smelting facility to process fly ash delivered from the Teshima Waste Treatment Facility as well as municipalities inside and outside the island, and a Valuable Metals Recycling Facility which includes incineration and melting systems for the pre-treatment of shredder dust (crushed/milled chips from used automobiles, used household appliances, etc.).

Recycling processes and their features

Our lead and tin smelting facilities no longer use ore as the raw materials but are now running based on 100% scrap materials. The Onahama Smelting & Refining Co. (one of our group companies), where they smelt copper, was the first to start processing shredder dust and continues to process the largest volume in the country. At the Naoshima Smelter & Refinery, where they operate based on Mitsubishi's unique copper smelting process, scrap materials such as shredder dust are first incinerated and melted, and then fed through the existing process. In either case, it is possible to attain 100% recovery in the form of base materials and thermal energy.
The resource recycling efforts using existing facilities require that the existing facilities and processes themselves meet zero emission requirements to begin with, to contribute to global environmental conservation. Mitsubishi's unique process at the Naoshima plant is described below. By connecting the respective smelting furnaces through launders, we have succeeded in implementing a continuous batch processing operation. The traditional process gave no choice but to allow sulfurous acid gas emissions during the transfer of the molten metal between furnaces. The Mitsubishi process can prevent such emissions and is highly effective in controlling environmental pollution. It was also instrumental in downsizing the overall facilities, which resulted in less energy consumption and lower operating costs. The Mitsubishi process has also been in successful use overseas in Canada, Korea, and Indonesia.



Performance and achievements

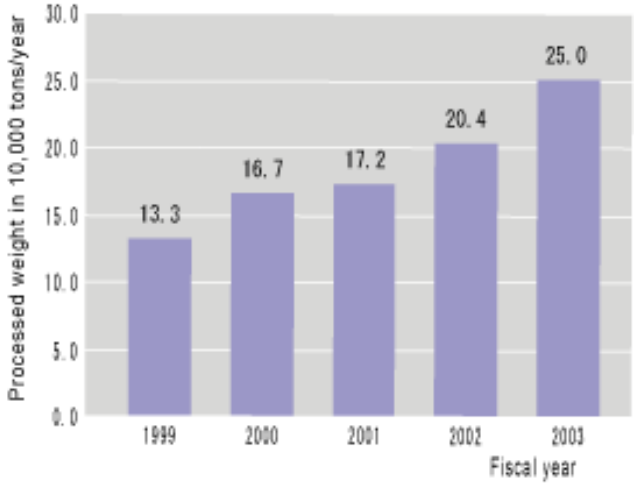
Given below are the weights of scrap materials processed in our overall smelting operations including our group companies. Thanks to our active involvement in promoting the recycling business, the performance is on the rise year by year. With the Naoshima recycling facility now in full-scale operation from July 2004, we expect the recycling performance to further grow in fiscal 2004.

Weights of scrap materials processed

(Tons/year)

		Fiscal 2001	Fiscal 2002	Fiscal 2003
Naoshima	Copper slag, gold Silver slag	45,000	37,500	44,500
	Shredder dust	0	0	11,800
Onahama	Copper slag	16,000	22,900	24,700
	Old tires	515	260	200
	Shredder dust	71,000	126,000	136,500
Hosokura	Used lead-acid batteries	29,200	14,900	31,000
	Lead slag	10,000	2,160	1,100
Ikuno	Tin slag	670	450	450
Total		172,385	204,170	250,250

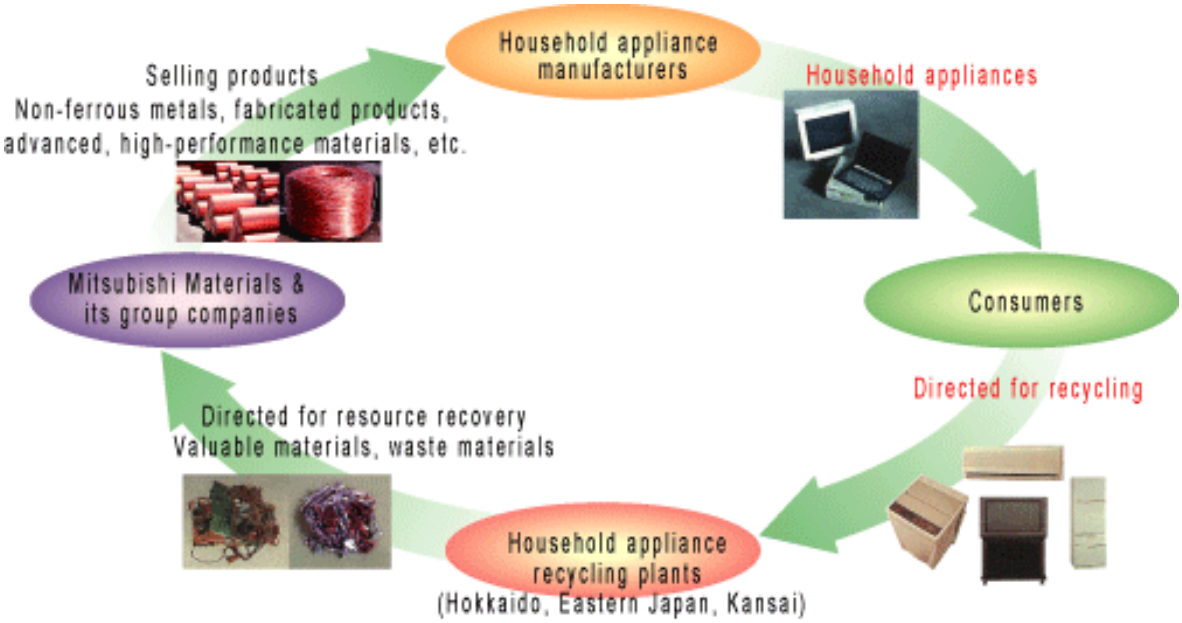
Yearly processing of scrap materials



Recycling household appliances (Resources & Environment Recycle Business Division)

We operate household appliance recycling plants, which we built jointly with household appliance manufacturers at three locations (Hokkaido, Eastern Japan, and Kansai Note). At these plants, we safely and properly disassemble and sort used electrical appliances from homes and offices (four items: air conditioners, refrigerators, TV sets, and washing machines) as well as used items of office automation equipment (personal computers).

The materials sorted at these plants are then processed at the appropriate facilities, including our cement plants, non-ferrous metals smelting plants, and other facilities in our group, and resources are efficiently recovered for reuse. This is another example of our efforts to contribute to creating a recycling-oriented society. The system used to recycle household appliances and resources is illustrated below.



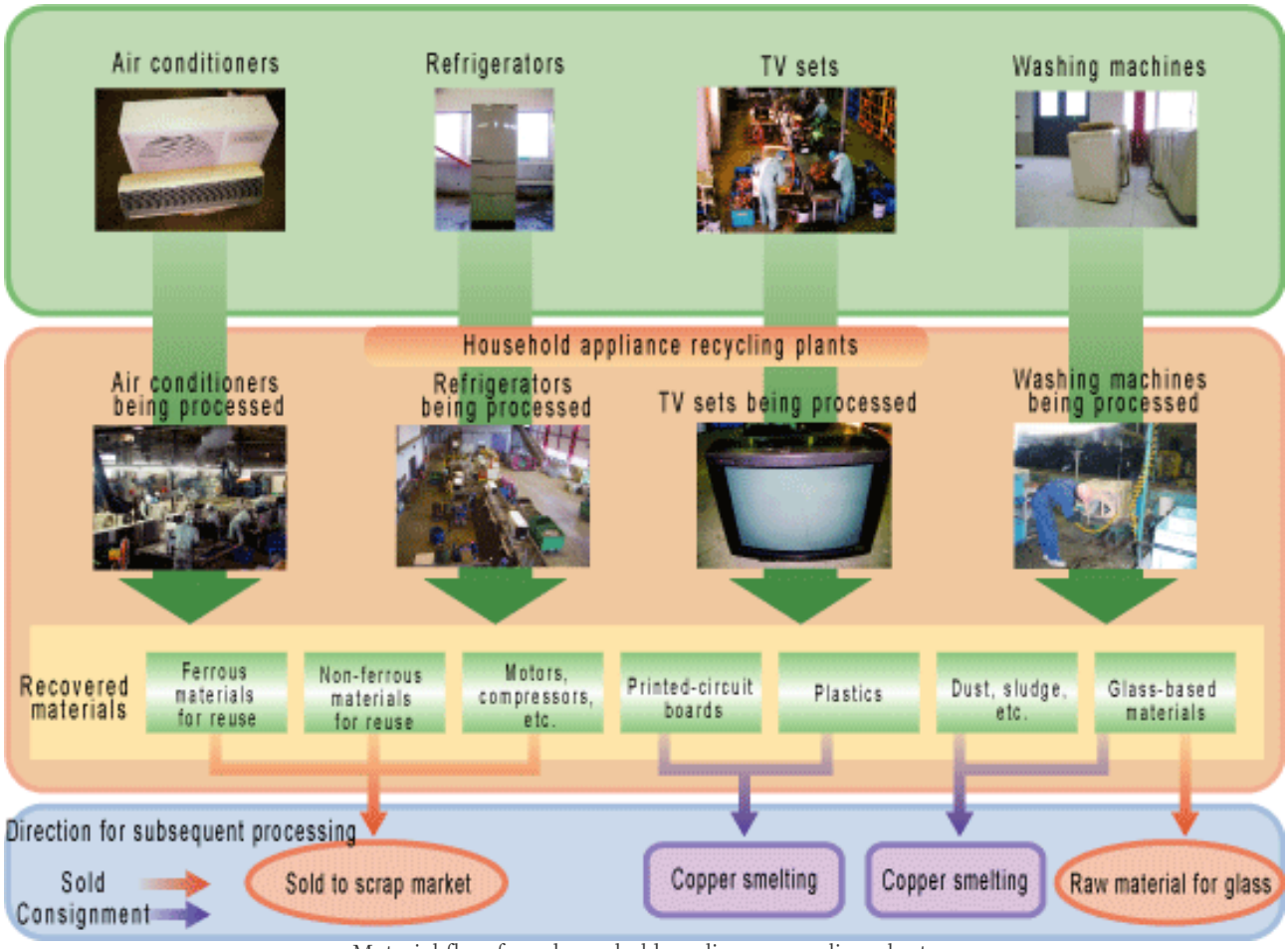
Mitsubishi Materials system of recycling household appliances and resources

(Note) Household appliance recycling plants
Hokkaido: Hokkaido EcoRecycle Systems Co., Ltd. (MMC's investment ratio: 43.75%)
Eastern Japan: East Japan Recycling Systems Corporation (MMC's investment ratio: 78.57%)
Kansai: Kansai Recycling Systems Co., Ltd. (MMC's investment ratio: 40.0%)

Recycling processes and their features

When the four kinds of used household appliances are delivered to our recycling plants, they are manually disassembled and sorted, and then further processed into fine chips through milling or crushing machines. The chips are then sorted into iron, copper, aluminum, plastics, glass, etc., using air, or by magnetic or eddy-current sorting processes. The sorted materials are then delivered to non-ferrous metal smelting plants, iron and steel manufacturers, glass manufacturers, etc. as appropriate, and recovered for reuse. Any hazardous waste, such as CFC's and other wastes, are taken to specialized business entities for environmentally-sound disposal.

At the Hokkaido and Eastern Japan recycling plants, they are working as hard as they can to accept other types of waste than household appliances, such as office automation equipment including personal computers and other industrial waste, in their efforts to maximize recovery of resources. The final goal in this recycling business is "zero disposal in landfills" which we are striving to meet by actively pursuing the development and introduction of advanced recycling technologies that, with the support of our group companies, will help us maximize the recycling rate. Material flow from the household appliance recycling plants is shown below.



Material flow from household appliance recycling plants

Performance and achievements

Approx. 1.2 million used household appliances were processed through the three recycling plants (Hokkaido, Eastern Japan and Kansai) in fiscal 2003. Shown below are details of the contributions to environmental load reduction achieved by the three plants.

Units processed at recycling plants

	No. of units (10,000 units)
Air conditioners	16
Refrigerators	41
TV sets	33
Washing machines	29
Total	119

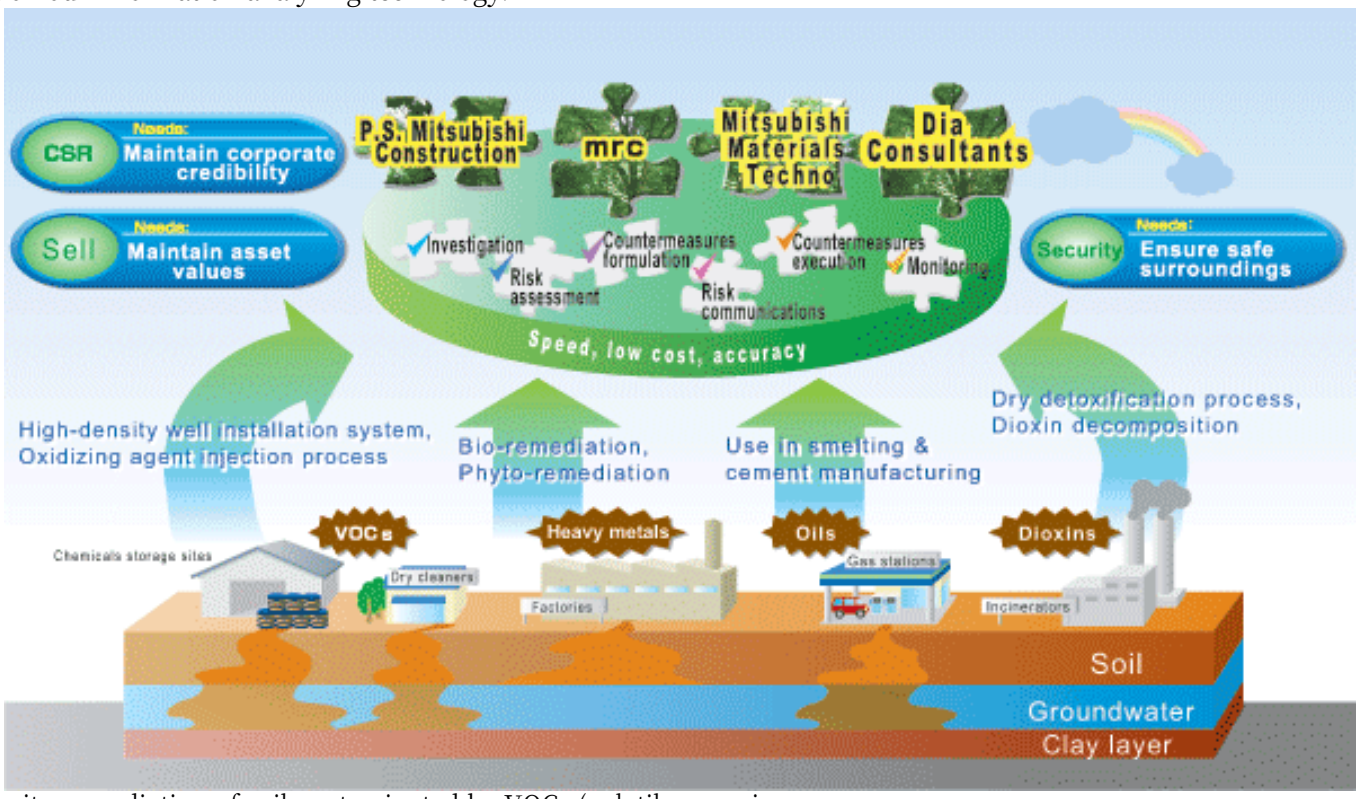
Estimated environmental load reduction by recycling plants(fiscal 2003)

Mineral resources recovery	43,500 tons/year
Energy resource saving (in terms of crude oil)	12,100 tons of oil/year
Final waste reduction	44,800 tons/year
Reductions in CO_2 emissions	26,700 tons of CO_2/year

Soil and groundwater remediation by Mitsubishi Materials group companies

(Mitsubishi Materials Natural Resources Development Corp., P.S. Mitsubishi Construction Co., Mitsubishi Materials Techno Corp., and Dia Consultants Co.)

The Mitsubishi Materials Group offers complete services to respond to the needs of customers with concerns about soil and related environments. The services extend from soil investigation to measurement and analysis, formulation and execution of countermeasures, and even monitoring services. We also offer risk assessment and communication services based on our information-analyzing technology.



For in-situ remediation of soil contaminated by VOCs (volatile organic compounds), Mitsubishi Materials Natural Resources Development Corporation (mrc) offers two types of solution: high-density well installation systems and a remediation process involving injection and circulation of an oxidizing agent.

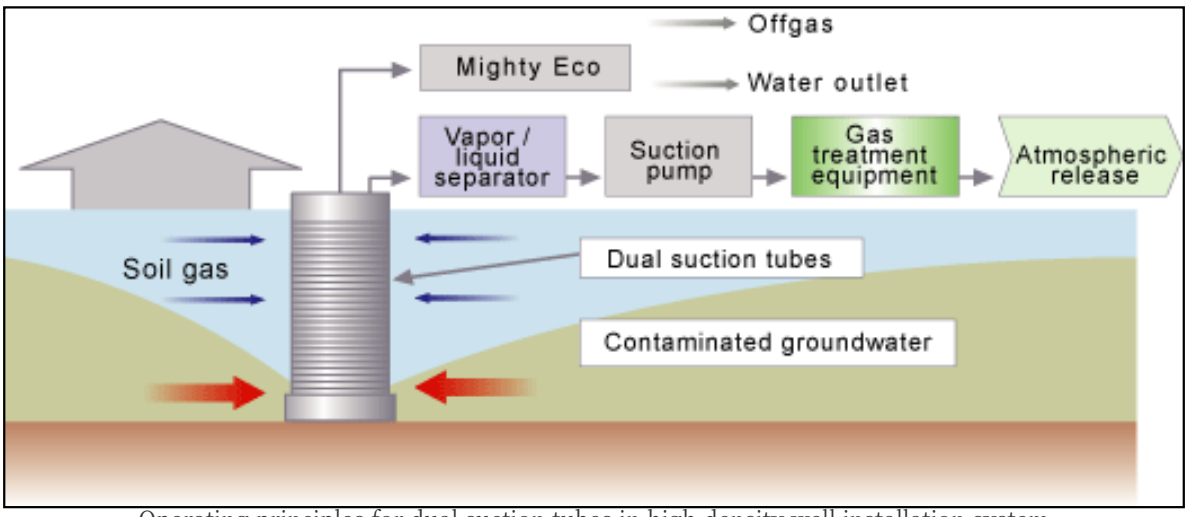
The high-density well installation system consists of wells with dual suction tubes installed in a lattice-like arrangement, each 5 to 10 meters apart, which draw off the groundwater and VOCs gases. The high-performance VOCs removal system named "Mighty Eco" does the job successfully at a relatively low cost and requires a smaller space. Mighty Eco proved its excellent performance and ease of operation in the Survey on the Development and Use of General-purpose Systems for Contaminated Groundwater Remediation conducted by the Ministry of the Environment in fiscal 2001.

In the remediation process involving injection and circulation of an oxidizing agent, the oxidizing agent is injected through water injection holes, and the VOCs contained in the water layer injected with the agent are decomposed and detoxificated. This process was employed in the Survey on Soil Contamination and Low Cost/low Load Remediation Technology and its Assessment conducted by the Ministry of the Environment in fiscal 2003. The process demonstrated its excellent performance in a verification test held at a site in Yamagata Prefecture.

High-performance VOCs removal equipment
- Mighty Eco -

Low cost / small space type

Available in three water processing rates
- 30 m^3/day
- 100 m^3/day
- 300 m^3/day



Operating principles for dual suction tubes in high-density well installation system

With its Dioxin Contaminated Soil and Wastes Detoxification System, Mitsubishi Materials Techno Corp. offers the services to cope with dioxin contamination, a critical problem in current times. In particular, dioxin contamination becomes an issue where incinerators are dismantled after many years of incinerating household waste. Solutions and some site work examples are given below.

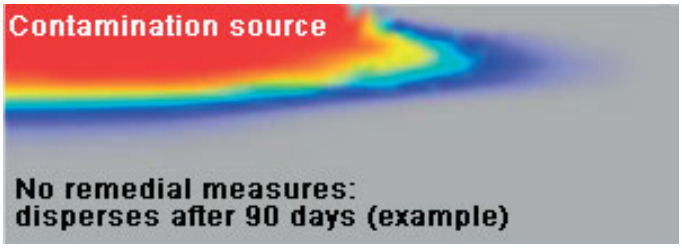
The system includes a process of on-site thermal decomposition of the residual ash and sludge that come from cleaning the inside of the furnace and that become exposed when the incinerators are dismantled. There, the process decomposes dioxin and extends further to the processing of heavy metals for encapsulation by adding a chelating agent. Thermal decomposition takes place at about 500 ° C, which is controlled by hot air generated by burning kerosene. This temperature is relatively low, and the process can therefore operate economically.

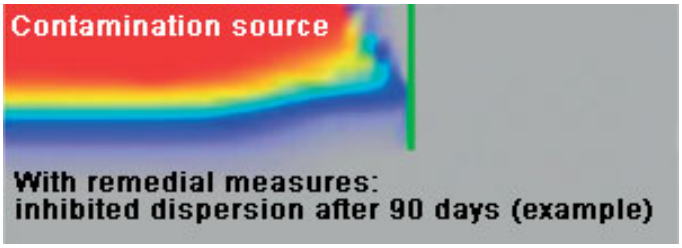

Dioxin decomposition systems


Gaseous dioxin decomposition systems


Dismantling work by P.S. Mitsubishi Construction Co.

Dia Consultants Co. has developed the 3D contamination prediction software (Dtransu: analysis software for predicting groundwater contamination and dispersion). As an example, the tool is useful in making risk assessments of contamination remedial measures by analyzing groundwater contamination behavior with or without cut-off walls.





Development of renewable energy sources

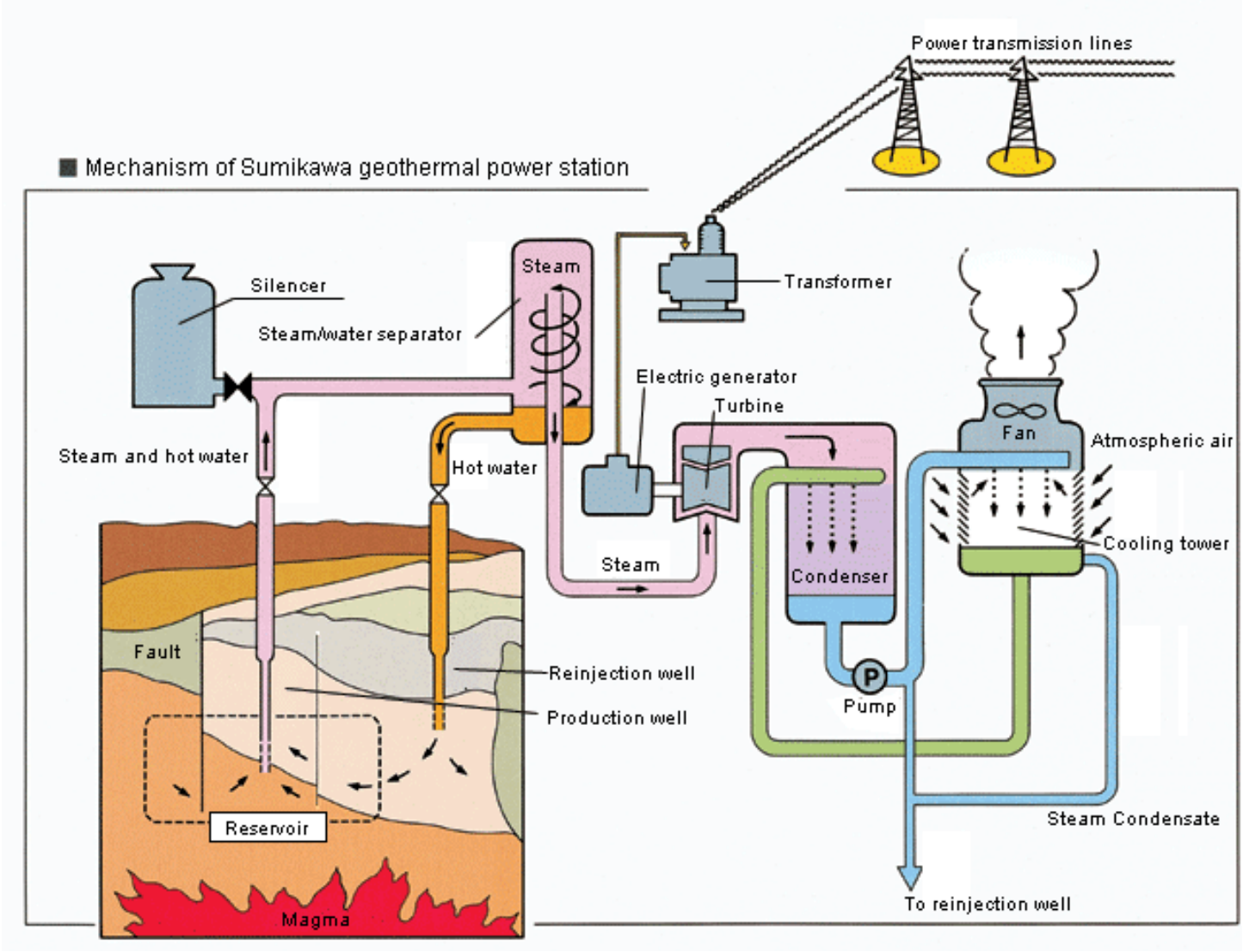
Geothermal and hydraulic power generation (Energy & System Strategic Company)

Onuma Geothermal Power Plant

Global warming is the most crucial issue that we need to address in the new century. It requires us to seek out renewable energy sources which can largely contribute to reducing greenhouse gas emissions.

Mitsubishi Materials have long been actively involved in the development and utilization of renewable energy sources, such as geothermal and hydraulic energy, taking advantage of the technology we have acquired in the underground resources business.

We have six hydraulic power generation plants (approx. 17 MW total) and two geothermal power plants (approx. 60 MW total; including steam supply) operating in Akita Prefecture. These power plants generate clean electric power of around 565,000 MWh per year.
Geothermal power generation, in particular, has been actively pursued in volcanic countries such as the Philippines, Mexico, Italy, and Indonesia. Japan is also known to have great potential for geothermal energy exploitation. Geothermal power generation utilizes steam energy that is extracted from underground by drilling wells as deep as 2,000 meters. It requires specialized techniques and/or technology to utilize effectively this kind of high temperature- underground resources in all stages of site survey, drilling, and maintenance of output power. We have acquired the necessary techniques and technology through our direct involvement in developing and operating our two geothermal power plants: the Onuma Geothermal Power Plant (9.5 MW: since 1974) and the Sumikawa Geothermal Power Plant (50 MW: since 1994). With this experience, we are actively participating in a geothermal area survey and technological development projects at home and abroad. We are also carrying out a feasibility study for the development of geothermal power plants in the Appi district of Iwate Prefecture and the Akinomiya district of Akita Prefecture.



Environmental Contribution in Environmental Business

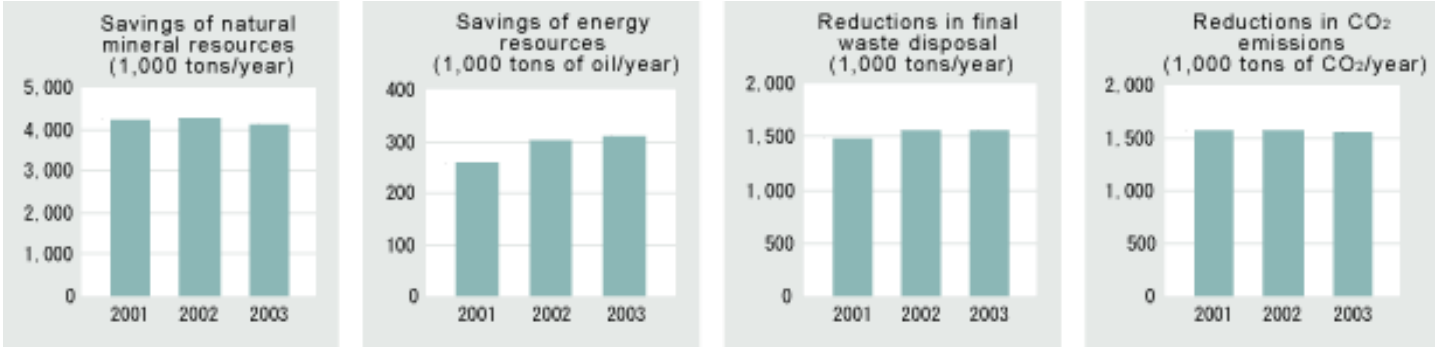
We have evaluated our contribution to the environmental load reduction in terms of its overall social scale, by applying a life-cycle assessment (LCA) method to our major environmental business.
Involved in this evaluation are four of our divisions, cement production, copper smelting, aluminum cans production, and recycling of end of life household appliances. The reduction of environmental load was estimated based on the quantity of waste and used materials which were processed for recycling through the facilities of those divisions involved. Described below are wasted and recycled materials accepted by the divisions.
We estimated the performance of the environmental load reduction in terms of savings and reductions with respect to (1) natural resource consumption (mineral resources and energy resources), (2) final wastes disposal, and (3) CO_2 emissions.
As shown below, our activities together with our group companies have resulted in saving, by our estimate, around 4.1 million tons of mineral resources and 310,000 tons of energy resources, reducing the disposal of final waste by 1.57 million tons, and reducing CO_2 emissions by 1.55 million tons in fiscal 2003.

Also shown for reference are yearly comparisons of the performance of the environmental load eduction in the respective sections covering the years from 2001 through 2003. Savings on energy resources have grown while the others stayed almost at the same level. Despite the varying factors, which include the reduced production we have steadily contributed to environmental conservation each year.
We are determined to strengthen our environment-related activities. We will continue evaluating our environment-related performance and effectively apply the results to further improving our environmental and production management.
Major waste and materials received by the divisions for recycling:
Smelting: Copper scraps, shredder dust, recycled oils
Cement: Soot (coal ash and the like), mineral slag (iron & steel, non-ferrous), sludge, waste plastics
Aluminum: Used aluminum cans
Household appliances: Four kinds of used electric appliances (TV sets, refrigerators, washing machines, and air conditioners)

Environmental and recycling efforts by Mitsubishi Materials and its group companies

Item	Unit	Smelting	Cement	Aluminum	End of Life household appliances	Total
Savings of natural mineral resources *1	1,000 tons/year	116	3,819	147	20	4,102
Savings of energy resources	1,000 tons of oil/year	56	132	116	5	309
Reductions in final waste disposal	1,000 tons/year	70	1,439	42	19	1,570
Reductions in CO_2 emissions	1,000 tons of CO_2/year	60	1,158	322	13	1,553
Production or processing *2	1,000 tons/year, 1,000 units/year	334	11,300	54	560	-

(Notes) Contribution by group companies proportionate to MMC investment ratio
*1 Items included for estimate: Iron ore, copper concentrate, bauxite ore, limestone, clay, silica
(Estimation was based on major items only.)
*2 Divisional production or processing (products for processing)
*Smelting: Production of electrolytic copper (1,000 tons/year)
*Aluminum: Production of aluminum beverage cans (1,000 tons/year)
*Cement: Production of cement and clinker for other uses (1,000 tons/year)
*End of Life Household appliances: Number of the 4 kinds processed (1,000 units/year)



Environmental load reductions (total of 4 divisions)

Environment-conscious Products, Services, and Development by Mitsubishi Materials Group

NOXER (by Cement Company)

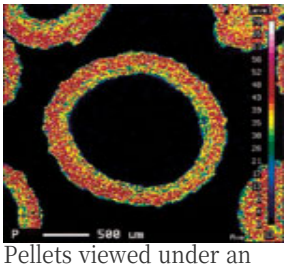
Air pollution, particularly in large urban areas, is a serious problem, which requires effective measures against vehicle emissions. Highlighted amongst the various measures being studied, including those against sources of pollutants, is a NOx (nitrogen oxide) removing material which works through a photocatalytic reaction and is used for the direct purification of exhaust emissions.
NOXER (Patent No. 988376) is a paving block which eats NOx emitted into the atmosphere. It is one type of ultimate eco-product in that it uses only solar energy.
NOXER works as follows

1. The block surface contains titanium oxide and generates active oxygen under solar UV rays.
2. The active oxygen, which is highly reactive, oxidizes the nitrogen oxides in the atmosphere and converts them to nitric acid ions (NO_3^-).
3. Nitric acid ions then react with alkaline components in the blocks and stabilize as nitrates.

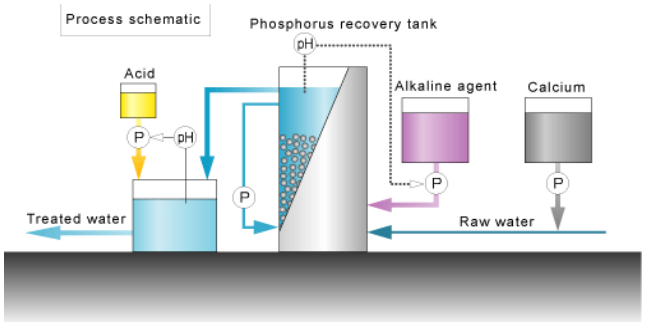
Wrinkle Base and Wrinkle Seed - technology to recover phosphorus from wastewater (by Cement Company)

Phosphorus is a nutrient which can cause eutrophication and its release must be restricted to maintain water quality. On the other hand, it is an important substance for use in food production and industry, while there is growing concern about the depletion of rock phosphate as a natural resource. The recovery of phosphorus from wastewater not only helps improve the water quality but contributes to resource conservation.
By using crystallization technology, we recover phosphorus from the water in the form of calcium phosphate deposited over the surface of Wrinkle Seed (seed crystals) pellets through a reaction with calcium. We have developed a system called "Wrinkle Base," which can control precisely the phosphorus reaction and recovery process. Wrinkle Seed pellets with adequate deposits of phosphorus that meet the fertilizer controlling criteria are taken out from the Wrinkle Base and supplied for use as phosphatic fertilizer. With the Wrinkle Base and Wrinkle Seed technology, we are hopeful to contribute to improving the water environment and conserving the precious phosphorus resources.

Wrinkle Seed pellets

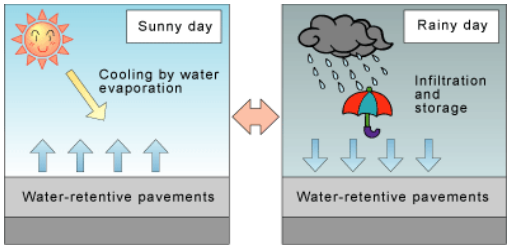


Pellets viewed under an electron microscope



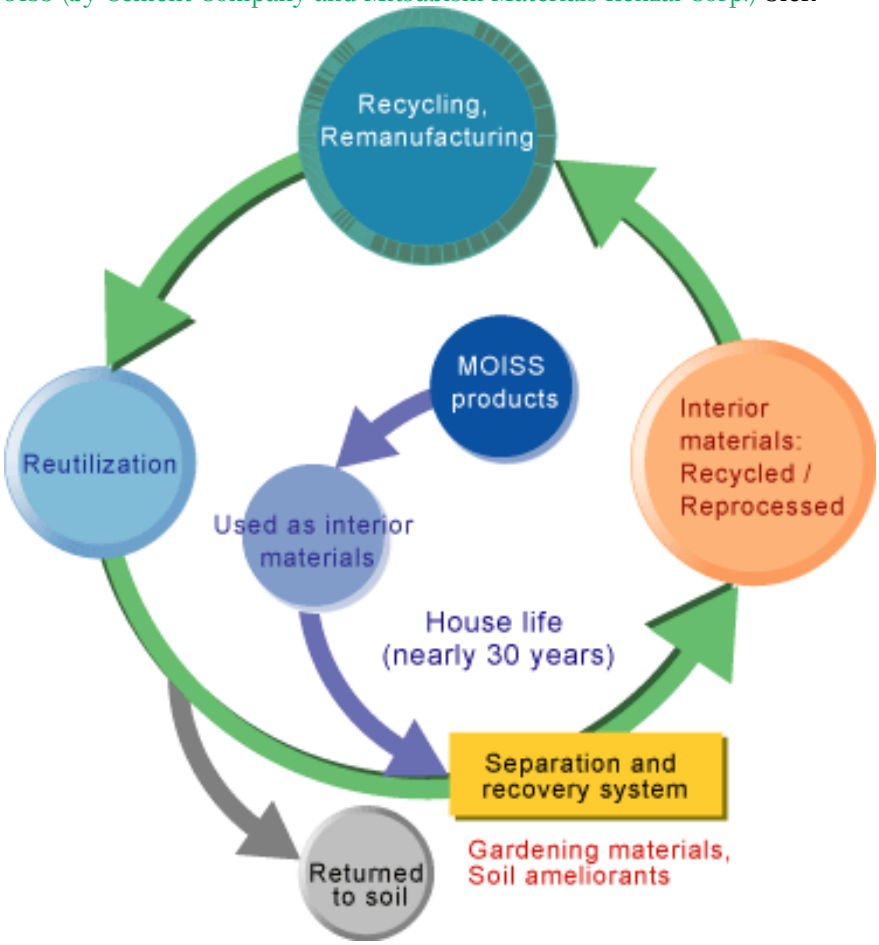
Water-retentive paving materials - Water-retentive Hoso-Ace (by Cement Company)

In urban areas in summer, solar energy is absorbed by roads and buildings causing their surface temperatures to rise higher than the ambient air temperature. This phenomenon, which is the basis of the urban heat island, is also a critical issue that must be addressed. Water-retentive road paving is one effective measure to cope with the problem. Rainwater stored in the paving materials starts to evaporate when the temperature goes up due to solar heat and can help restrict the temperature rise.
Water-retentive pavements can be constructed easily, simply by filling Hoso-Ace prepared in the form of liquid cement mixed with water into open-graded asphalt concrete. The construction time can also be kept to a minimum as Hoso-Ace in the form of liquid cement cures fast and provides the strength needed in a short time.

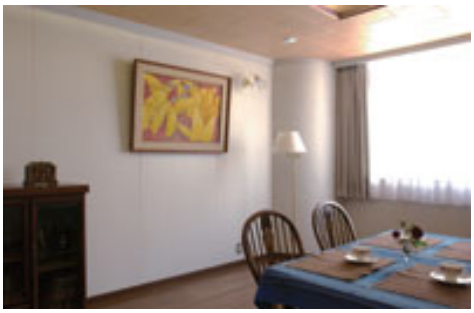


Environment-conscious construction material - MOISS (by Cement Company and Mitsubishi Materials Kenzai Corp.)

Sick house syndrome is a serious social issue related to housing. Condensation caused by indoor humidity, another major problem in housing, can lead to degradation in the durability of housing materials and invites the spread of ticks and mildew.
MOISS is an innovative interior building material, which is capable of absorbing and decomposing VOCs (volatile organic compounds) that are considered to cause sick house syndrome. The main components that form MOISS are calcium silicate hydrates (tobermolite crystals) and a natural clay mineral known as vermiculite. The clay mineral has a layered structure, and the interlayer activation decomposes the VOCs into harmless substances. The combined effect of tobermolite's large specific surface area and the water of crystallization of vermiculite can provide solutions to controlling indoor humidity, dew condensation, and excessively dry indoor air in winter.
MOISS is an inorganic material, but it has the toughness and workability of wood, and what is more, it can be nailed, dispensing with the need for adhesive agents (completely dry process).



MOISS scrapped after use can be crushed and returned to the soil as silica fertilizer. As seen above, MOISS is a sustainable building material that can play an important role in multiple phases from building comfortable housing environments to resource recycling.

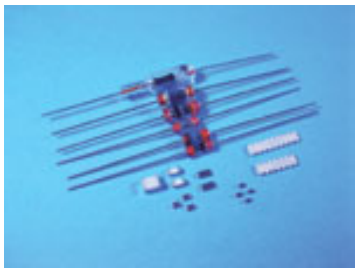


Lead-free copper alloy - Eco-Brass (by Metals Company and Sanbo Copper Alloy Co.)

Brass and bronze alloys have good workability and resistance to corrosion and are used in a variety of industrial applications, such as water handling devices, and automobile and electronic parts. Most of these alloys contain 2 to 7% lead to attain the best machinability for the metals. However, because of the reemphasis on the harmful effects of lead in recent times, lead-free products are now being sought in a variety of markets.
Eco-Brass is a lead-free material and still provides excellent machinability that we made available by adding silicon, which is harmless to the human body, instead of lead. It is an innovative "super" material in that it is as strong as stainless steel and eliminates the problem of stress corrosion cracking or dezincification corrosion.

Eco-Brass was first brought to market in 1999, and has been well received in the market segments that deal with water handling devices, automobile parts, electronic parts, etc., with monthly sales now reaching as high as 300 tons. It is patented in the US, Australia, Taiwan, and Korea and is also officially registered with the CDA (Copper Development Association) in the US. Furthermore, we signed a license agreement with Wieland-Werke AG of Germany at the end of 2003, making Eco-Brass a highly valued world-class lead-free copper alloy. Eco-Brass, with no constituents, either known or suspected, that impose environmental burdens, will continue to contribute to safety and environmental conservation.

Lead-free electronic parts (by Advanced Products Strategic Company)

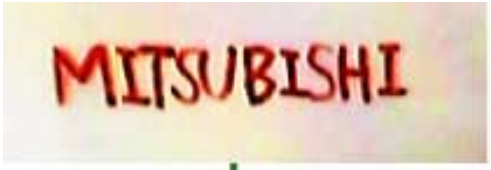


In the production of electronic devices, the electronic components are generally connected to printed circuit boards by soldering. The terminals of the electronic components are often solder-plated to facilitate soldering.
Traditional soldering materials contain about 40% lead. However, the lead from the solder joints on used electronic devices after disposal can dissolve into the groundwater, and this has become an issue. Therefore, traditional soldering materials are now being replaced with lead-free materials.
We moved swiftly to produce electronic components such as surge absorbers, chip thermistors, LC-combined EMI suppression filters, and chip antennas. with lead-free terminals, without sacrificing solderability or other functions. We were ready and started producing chip based products in September 2002. We have also been producing lead wire type surge absorbers that meet the requirements of the RoHS directive since June 2004. The soldering temperature for lead-free solder is inevitably higher than for solder that contains lead, and this can result in a higher stress over the electronic components.
We use lead-free, Sn-Ag-Cu based materials which are most commonly used in the industry today. This means the products we manufacture are soldered at relatively high temperatures. However, we have successfully managed to maintain the reliability of our products, which are highly rated by the users.

RoHS: EU Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Photocatalytic coating liquid "LC-80T" (by Advanced Products Strategic Company)

A photocatalytic reaction is a reaction activated by UV rays. It provides the activated material with hydrophilic properties and decomposes and cleans organic contaminants (grease, dirt, bacteria, etc.). As the technology works by effectively utilizing solar light or even indoor illumination, it is attracting a great deal of interest.
Photocatalytic coating liquid "LC-80T" is a coating product we commercialized by using our own techniques for dispersing small particles of titanium oxide, the most representative photocatalytic substance. LC-80T can be applied to a base material to form a highly transparent thin film, which reacts by capturing light and provides hydrophilic properties and prevents any buildup of dirt, bacteria, and odor by effectively decomposing organic substances on the surfaces. The scope of application of LC-80T will extend into wide areas, such as coatings for building exteriors, outdoor signs and billboards, gravestones, etc., where the coating can work as a "self-cleaner" from exhaust emissions, mildew, and other dirt, or for minimizing condensation on windows, or for deodorizing cars and rooms in houses, to name a few. In particular, if LC-80T is applied to building exteriors, it should help reduce maintenance costs, as the labor and solvent costs for cleaning can be reduced.



Before exposure to UV rays

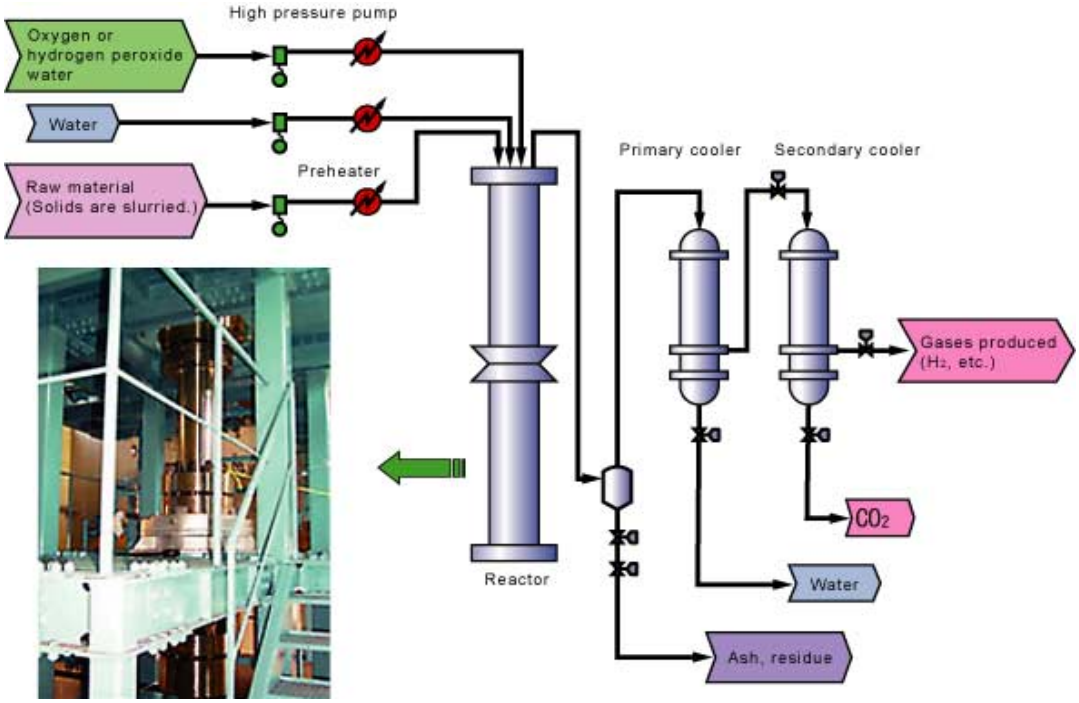
After exposure to UV rays

Decomposition of felt-tip pen ink

- Base material: PET film
- $TiO_2 : SiO_2 = 9 : 1$
- UV intensity: 1.2 mW/cm^2
- Exposure time: 144 hours

Developing cleaning/reforming technology for unused/recycled energy resources utilizing supercritical water (by Energy & System Strategic Company)

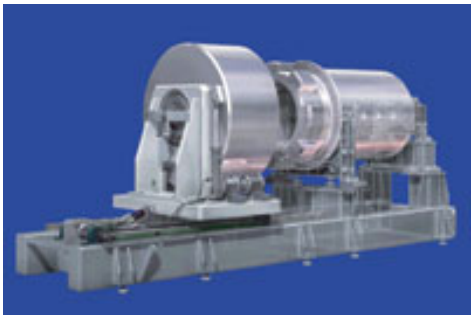
Supercritical water is defined as water at 374 ° C or above and under 22.1 MPa (218 atm) or higher pressure. In supercritical water, a variety of hydrocarbon-based substances become easily decomposable. Based on this fact, efforts are underway to develop the technology for processing hazardous materials into harmless materials by decomposing hazardous substances, such as PCB and dioxin. In traditional decomposition processes, chemicals such as acids were utilized as the catalyst. Some of them also accompanied SOx or NOx emissions from sulfur or nitrogen contained in the organic substances as impurities. On the other hand, utilization of supercritical water makes it possible to build a safe process in which harmless water and oxygen work alone to decompose the substances without generating SOx or NOx.



What we are developing is a clean-energy production process, utilizing supercritical water. Through a decomposing or reforming process in supercritical water, unused or difficult-to-use energy resources, or biomass are converted to clean and harmless energy sources, such as hydrogen and methane. To give an example, low grade coal with a low heating value is reformed to coal with a high heating value and with most of its impurities removed; heavy oil with high viscosity and impurities is cracked and refined to gasoline, light oil, etc. We are certain that the technology can contribute greatly to reducing the environmental load by improving fuel reutilization rate and minimizing hazardous waste emissions into the environment. (Testing facility for conversion-to-fuel process using supercritical water is illustrated on the right.)

Developing a process based on cleaning, extracting, surface reforming, and synthesizing technology utilizing supercritical carbon dioxide (by Energy & System Strategic Company)

Cleaning agents used for cleaning and degreasing industrial products such as metal parts and products include, in many cases, dichloromethane, hydrocarbon solvents, chlorofluorocarbon, etc. These chemical components need to be treated carefully because they can be carcinogenic and environmentally hazardous (including depletion of the ozone layer), and also include flammable substances. Safe alternative cleaning agents are being sought to replace these solvents.



Supercritical carbon dioxide is defined as carbon dioxide at 31 ° C or above and under 7.4 MPa (73 atm) or higher pressure. It is characterized by the fact that ① its viscosity is so low that it flows like a gas, and that ② it can dissolve organic substances, such as grease. Additional advantages include the fact that and ③ carbon dioxide is innocuous and non-flammable, and that and ④ the organic substances which dissolved in supercritical carbon dioxide can be separated and recovered from the carbon dioxide by varying the fluid's pressure and temperature as necessary. By exploiting the features noted above, we are developing a cleaning and extraction process that can replace traditional solvent cleaners. We are also working to develop new processes, such as a process to modify material surfaces and a process to synthesize functional materials, utilizing supercritical carbon dioxide. These are all part of our efforts to commercialize technologies that do not involve the use or emission of hazardous organic solvents. (The picture on the right shows an example of general-purpose pressurizing equipment, ASIP chamber, which we developed for use in a variety of processes requiring high-pressure fluids like supercritical carbon dioxide.)

Chronology of Our Environmental Conservation Activities

1918	Established the Mining Research Institute in Shinagawa-Ku, Tokyo, and began research into measures against pollution from mining and other sources.
1970	Established Environmental Management Office in the General Affairs Division, dedicated to managing environmental issues and measures in response to increasing environmental concerns, especially mining-related pollution.
1974	Completed construction of a geothermal power plant (6,500 kW) in Onuma, Kazuno-Shi, Akita Prefecture, which began supplying electric power to our Akita Refinery.
1975	Started collecting and recycling used aluminum cans.
1983	Reorganized the Environmental Management Office into an autonomous organization under the new name of the Environmental Safety Management Department.
1988	Started accepting and processing industrial waste, such as old tires, at our cement plants. We were the first in Japan to produce and sell SOT (Stay-On-Tab) type aluminum beverage cans.
1990	Mitsubishi Metal Corporation merged with Mitsubishi Mining & Cement Co., Ltd. to form a new entity called Mitsubishi Materials Corporation.
1991	Tohoku Kaihatsu Co., Ltd. was merged with Mitsubishi Materials Corporation, with the new entity retaining the latter name.
1993	Published the program for our voluntary environmental action plan.
1994	Started our corporate-wide resources recycling business by establishing the Global Environments and Energy Business Headquarters, now named the Energy & System Strategic Company.
1995	Sumikawa Geothermal Power Plant (50,000 kW) in Kazuno-Shi, Akita Prefecture, was put into operation utilizing steam supplied from us.
1997	Publicized our maxim: "For People, Society, and the Earth" and Ten-Chapter Action Guidelines. The Okegawa and Kitamoto Plants (located in Okegawa and Kitamoto cities in Saitama Prefecture) were awarded ISO 14001 certification for the first time within Mitsubishi Materials. A sewage sludge processing facility was completed in the Kurosaki Plant (today this is the Kurosaki Manufacturing Section, part of the Kyushu Plant's Production Department), which started processing 100 tons/day sewage sludge generated in Kitakyushu City. Received the Prime Minister's Award for the recycling of aluminum cans.
1998	Set up the GPM Committee.
1999	Set up the Committee for the Nuclear Safety Measures and strengthened our inspection system by appointing a Chief Advisor for Nuclear Safety.
2000	Played a central role in establishing and holding the first General Meeting of the International Network for Safety Assurance of Fuel Cycle Industries. Appointed a Chief Green Officer (CGO) as the person ultimately responsible for administering all the environmental issues across our own and our group companies. The Kyushu Plant was awarded the Construction Minister's Award for promoting recycling operations.
2001	Completed construction of household appliance recycling plants in Hirakata City, Osaka, Tomakomai City, Hokkaido, and Uguisuzawa-Cho, Miyagi Prefecture. The integrated UBC processing systems started operating.

2002	The Naoshima Eco Town Project (Naoshima-Cho, Kagawa Prefecture) was approved by the Government and started up. Began accepting and processing meat-and-bone meal for use as one of the raw materials in cement. Publicized research achievements on shredder dust processing technology for recovering non-ferrous metals and rendering them harmless, based on joint efforts by the New Energy and Industrial Technology Development Organization and the Center for Eco-Mining. Announced our policy to reinforce and expand the incinerator dismantling business by collaboration among Mitsubishi Materials group companies. Received the fiscal 2001 Technology Award from the Japan Aluminum Association.
2003	Started environmental recycling business in Ikuno-Cho, Hyogo Prefecture, mainly covering used office automation equipment. Completed the "AxGreen" gasification furnace in Shimokita in Aomori Prefecture. Developed a 1-kW power generation module using low-temperature solid oxide fuel cells (SOFC). Conducted a survey based on a life-cycle assessment (LCA) method to measure the social effects of the environmental load reduction achieved by our environmental and recycling efforts. Developed the "Core-Maru" anchorless drilling machine for soil contamination assessment (Power Metallurgy Products & Tools Company, and Mitsubishi Materials Natural Resources Development Corp.) Opened the Central Research Institute's Hosokura Environmental Research Center in Uguisuzawa-Cho, Miyagi Prefecture.
2004	Developed a 1-kW power generation system using low temperature solid oxide fuel cells (SOFC). Developed an advanced processing system for removing phosphorus. Completed Eco Town facilities in Naoshima Smelter & Refinery. Participated in 2004 Eco-Products International Fair in Malaysia. Participated in Eco-Techno Exhibition. Participated in Soil/Groundwater Environmental Exhibition. Participated in 2004 Eco-Products Exhibition.

Corporate Overview

Company Name:	Mitsubishi Materials Corporation
Headquarters:	1-5-1 Otemachi, Chiyoda-ku, Tokyo 100-8117 , Japan
Founded:	1871
Incorporated:	1950
Outline of Operations:	Our group, which includes Mitsubishi Materials Corp. as the parent, 238 subsidiaries, and 77 affiliated companies, is engaged mainly in the following industrial segments: base materials (non-ferrous metals, cement, etc.), fabricated metal products and aluminum beverage cans, semiconductor materials and electronic products, and energy and the environmental business.
Capital:	99,396 million yen, at end of March, 2004
Sales:	948,200 million yen (consolidated), 487,500 million yen (parent only), at end of March, 2004
Employees:	20,930 (consolidated), 5,162 (parent only), at end of March, 2004

MITSUBISHI
MITSUBISHI MATERIALS CORPORATION

関連URL

三菱マテリアル2004環境報告書への記載内容の参考となるWebサイト一覧

■ 会社概要　当社のホームページです。下記のサイトへもここから入ることができます
http://www.mmc.co.jp

● 環境保全に関するページ
http://www.mmc.co.jp/japanese/environment/index.html

● 各カンパニーの事業概要
http://www.mmc.co.jp/japanese/business/index.html

● 環境ビジネス
http://www.mmc.co.jp/env/index.html

● アルミ缶リサイクル
http://www.mmc.co.jp/kids/recycle_aluminumcan/index.html

● 関係会社一覧
http://www.mmc.co.jp/japanese/corporate/subsidiary.html

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