ENVIRONMENTAL REPORT 2002

SHARP

CONTENTS

About this Report

This report contains information about the environmental activities of Sharp Corporation and its consolidated subsidiaries during fiscal year 2001 (April 2001 to March 2002) and also introduces some policies and objectives for fiscal year 2002 and beyond.

[Places of business appearing in this report]

Domestic production bases: Tochigi site, Yao site, Hiroshima site, Nara site, Shinjo site, Fukuyama site, Mie site, Tenri site, Tanabe site
Overseas production bases: 22
Consolidated non-production sites (domestic and overseas)

Message from the President

The 21st century has started out as the century of the environment, and environmental preservation is being heavily promoted in various phases, through political measures by many countries all over the world, corporate activities and personal life.

There are still many issues that must be addressed in order to prevent further damage to the earth's environment, and approaches to solving these problems are not yet well under way.

Although environmental efforts put forth by manufacturers, including Sharp, such as preventing air and water pollution and reducing emissions of harmful substances, have been successful in reducing the risks to the earth's environment, many issues still remain. Other efforts that contribute to environmental preservation, such as improvements in energy efficiency to prevent global warming and resource efficiency, have just begun.

We need to reinforce our policy of producing excellent, environmentally conscious products through processes that drastically reduce the burden on the environment in an effort to promote daily corporate activities.

From this standpoint, Sharp is committed to developing environmentally conscious products with outstanding features. This effort is focused primarily on LCDs, which are highly energy efficient; and photovoltaic systems, which create clean energy to supplement energy demand. We achieved zero discharge to landfill at all our domestic production sites in fiscal year 2001, one year ahead of schedule.

We will continue to strengthen these efforts and actively practice environmental management, thus playing a leading role in realizing a sustainable society—a society in which resources are recycled.

This effort requires that all employees observe the existing rules on environmental preservation and be highly aware of environmental preservation. The entire company, including all divisions and departments, will hold intensive informational meetings and training seminars on environmental laws and regulations and environment-related strategies. Furthermore, we will urge each of our employees to adopt an environmentally conscious lifestyle through these activities.

The Environmental Report is our public statement on Sharp's efforts toward realizing a sustainable society in which resources are recycled. We will release more information to improve our social and customer communications, thus further improving our effort to achieve environmental management.

We invite you to share any opinions and suggestions you may have regarding this report and our activities.

Katsuhiko Machida
President
Sharp Corporation

Sharp's Commitment toward a Sustainable Society

In 1992, Sharp instituted the "Basic Environmental Philosophy: Creating an Environmentally Conscious Company with Sincerity and Creativity", and established its Basic Regulations for Preserving the Environment. Later, in 1997, Sharp implemented the 3G-1R Strategy, comprised of four action themes, and has ever since guided environmental preservation activities companywide.

In 2001, Sharp began its Super Green Initiatives, based on the 3G-1R Strategy, according to which we categorized the relationship between Sharp and the environment into six stages: management, planning/design, manufacturing, recycling, logistics, and mind-set. The whole company then identified and implemented specific objectives and countermeasures for each of these stages.

It has been just ten years since we instituted our "Basic Environmental Philosophy." On the occasion of the 10th anniversary, we again return to the fundamentals, striving to build a solid organizational basis for supporting environmental management.

We have established an Environmental Compliance Committee to ensure our employees observe laws and social rules concerning environmental preservation, and are enhancing their support for environmental preservation through environmental education and practical activities.

We will make public information on our corporate efforts to achieve environmental management, with the aim of encouraging extensive social communication.

Our Environmental Protection Group will assume the overall responsibility for safe control of chemicals and gases stored at our plants, which is a crucial factor in environmental preservation. Furthermore, the entire Sharp Group will collaborate to set up a system to enhance our efforts to prevent environmental pollution and accidents.

As we put our environmental management program into practice, we are now working on the creation of an Environmental Management Evaluation Index to assess the amount of burden we place on the environment. We will identify, analyze and measure the total scope of environmental burden in terms of exact numerical values. This will permit us to implement more effective countermeasures to reduce our impact on the environment.

In fiscal year 2000, Sharp added an environment category to its divisional business performance contribution evaluation, thus introducing an assessment system for environmental promotions of business management.

We will introduce the Environmental Management Evaluation Index beginning in fiscal year 2003. This index will enhance the environmental awareness of management and launch effective promotions to further our contribution to the creation of a sustainable society.

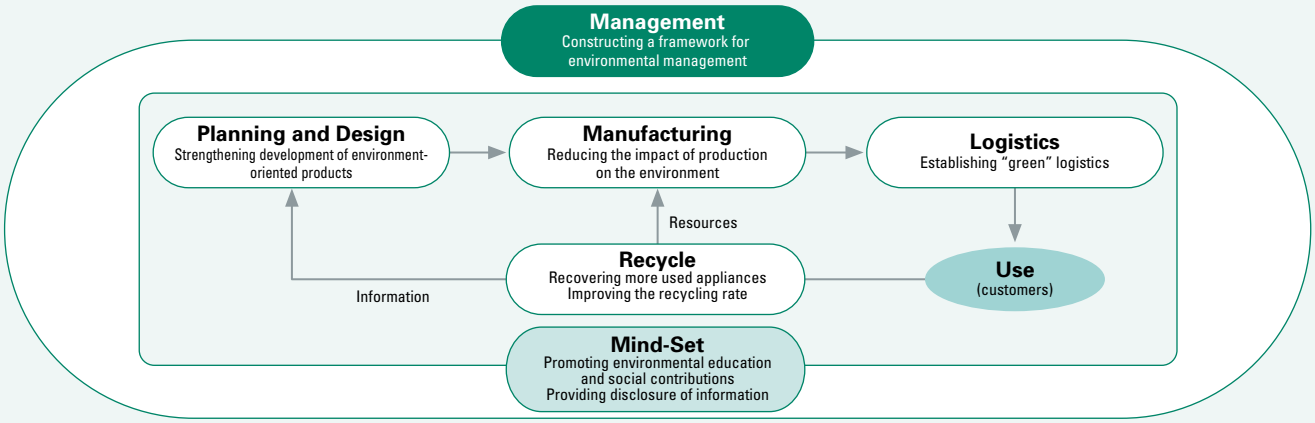
T. Kondo

Teruhiko Kondoh
Corporate Director,
Environmental Management and
Group General Manager,
Environmental Protection Group

3G-1R Strategy

GP：Green Products
(Develop environmentally conscious products)
GF：Green Factories
(Manufacture with the environment in mind)
GM：Green Mind
(Create an ecologically minded company atmosphere)
RB：Recycling Business
(Collect and recycle used products where feasible)

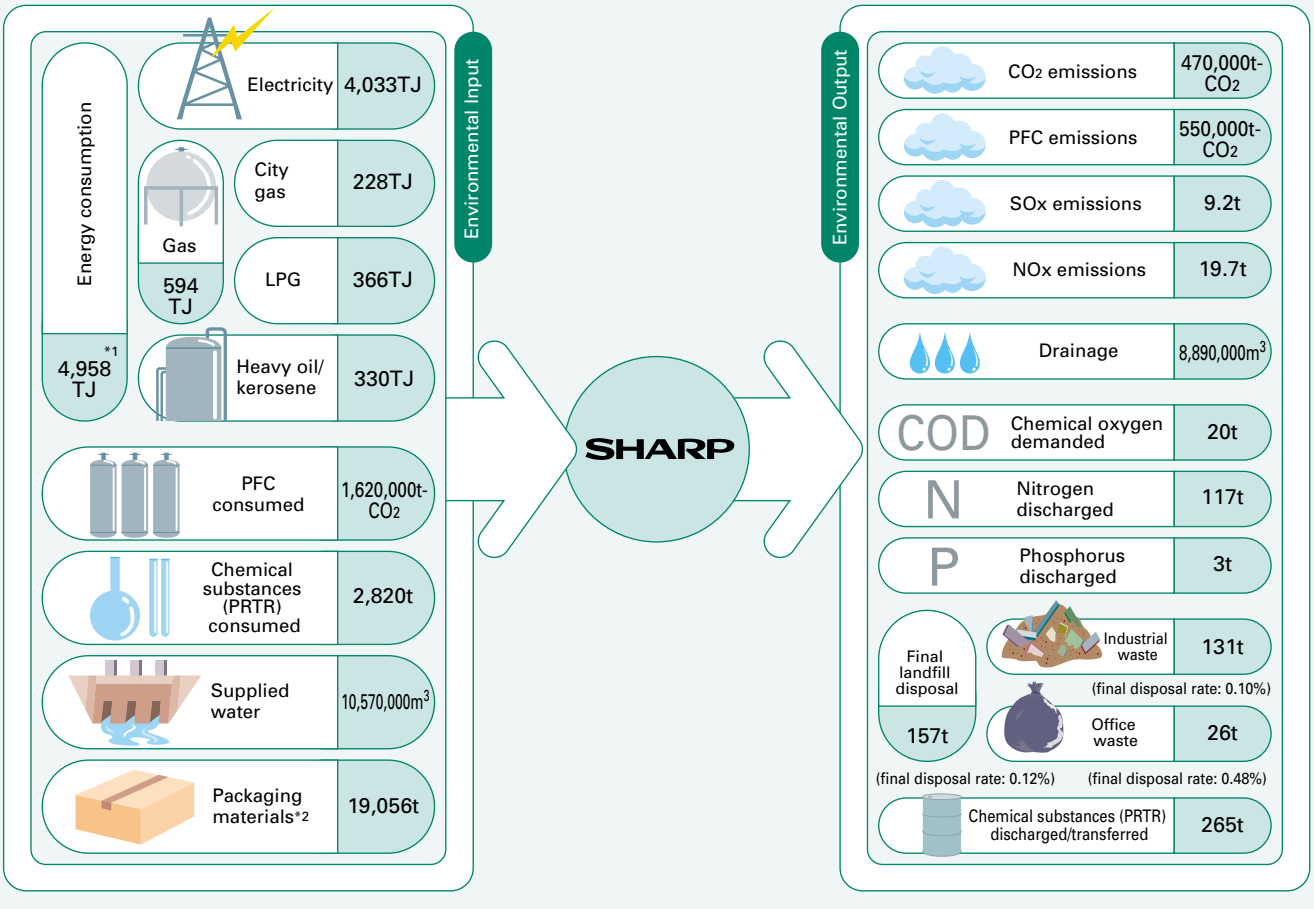
Six stages of Super Green Initiatives



◎ For each stage in the fiscal year 2001 activities, see pages 5 and 6 of "Main Objectives and Level of Achievement in Fiscal Year 2001".

Environmental mass balance in fiscal year 2001 (all production sites in Japan)

We continued to minimize our energy consumption for fiscal year 2001 so that usage equalled that of the previous year. We reduced emissions, such as PFC (perfluoro compounds) used in LCD and semiconductor plants, by 25% compared to the previous year. The amount of recycled industrial waste increased sharply, reducing final landfill disposal by 91% compared to the previous year. Through these efforts, we have achieved zero discharge to landfill at all our domestic production sites. Although our consumption of toxic chemicals increased 5% over the previous year due to increased production, the amount discharged or transferred was cut by 53%.



*1 TJ = 10^{12} joules
*2 Cardboard, polystyrene foam, other plastics, timber, etc.
• The value announced publicly by the Electricity Business Association is used as a CO_2 discharge coefficient.
• The scope for totaling energy consumption and CO_2 emissions includes all domestic production sites and office buildings of Sharp Corporation.

Main Objectives and Level of Achievement in Fiscal Year 2001

Super Green Initiatives

We launched the Super Green Initiatives based on our 3G-1R strategy in fiscal year 2001, so that Sharp could help contribute to the realization of a sustainable society. We set mid- and long-term objectives, and fiscal-year objectives for all stages of the Super Green Initiatives to ensure steady progress.
The table on the right shows the main objectives and achievement for fiscal year 2001. Of a total of 23 objectives, 19 were attained. We will concentrate on tackling unachieved objectives as high-priority items for fiscal year 2002.

	Promotional Themes
1 Management Stage	Improving environmental management company-wide
	Environmental risk management
	Constructing an environmental management system
2 Planning and Design Stages	Promoting green purchasing
	Establishing a general assessment system for green products
	Developing green-seal products
	Improving the safety of parts and materials
	Consolidating 3R technology
3 Manufacturing Stage	Establishing green factories
	Preventing global warming
	Reduction of waste
	Controlling chemical substances
4 Recycle Stage	Recycling used products
5 Logistics Stage	Cutting CO_2 generated by distribution
	Reducing packaging materials
6 Mind-Set Stage	Environmental education
	Social contributions
	Promoting information disclosure and environmental communication

	Objectives	Mid-term Objectives (year achieved)	Objectives for Fiscal 2001	Achievement in Fiscal 2001	* Self Evaluation	See page
	Integrating the environmental management system	Major bases of all domestic sales/service companies to acquire ISO integrated certification (2001)	Same as left	100%	○	14
		All domestic production sites to acquire ISO integrated certification (2002)	Preparing environmental management manuals for integration	100%	○	14
	Acquiring ISO14001 certification at overseas production sites	All overseas production sites and major sales companies (31 bases) acquire ISO certification (2001)	Same as left	29 bases (total)	△	14
	Complying with environmental laws and rules	Strengthen corporate compliance with laws (2005)	Preparing for institution of environmental compliance committee (institute in May 2002)	100% (established in May 2002)	○	15
	Introducing environmental accounting	Introduction worldwide (2003)	Introduction domestically	100%	○	16
	Executing green purchasing	Implementation worldwide (2003)	Introducing into Malaysia	100%	○	17
	Conducting environmental impact assessments of goods based on LCA	Conducting general assessments (2003)	Conducting CO_2 assessments on major goods	100%	○	19
	Expanding the sales ratio of green-seal products	Sales ratio: 50% (2003)	100 models Sales ratio: 30%	112 models, Sales ratio: 32.2%	◎	18, 19, 21
	Employing lead-free solder for all products	Introduction worldwide (2003)	Use lead-free solder in all new products in Japan	45 models	○	22
	Practical recycling of plastic materials	Practical recycling of mixed plastics (2003)	Employing plastic material (polypropylene resin) recycling technology for washer tubs	100%	○	23
	Commercializing materials designed with considerations for disassembly	Applying to LCD application products (2005)	Developing easy-to-disassemble fixtures	100%	○	24
	Introducing green factory guidelines	Introduction worldwide (2003)	Introduction domestically	100%	○	25
	Reduction of CO_2 emissions per production unit	Cutting by 25% from 1990 levels (2010)	Product production sites: cutting by 2% from the previous year	–1.1%	×	26, 27
			Device production sites: cutting by 5% from the previous year	+33.8%		
	Achieving zero discharge to landfill sites company-wide (final disposal rate: less than 0.5%)	Achieving domestically (2002), at overseas production bases (2004)	Achieving final disposal rate of less than 0.5% at all production sites in Japan (ahead of mid-term schedule)	0.1% Objectives achieved one year in advance	◎	28, 29
	Controlling total discharge of materials	Cutting by 4% from 1998 levels (2002)	Cutting by 2% from the previous year	Increased by 24%	×	28
	Reduce discharge of toxic chemical substances	Cutting by 50% from 2000 domestic levels (2003)	Cutting by 10% domestically	Cut by 53%	◎	30, 31
	Recycling four items of consumer electronics	Achieving recycling rate that exceeds standard values prescribed by law (continued)	Achieving recycling rate that exceeds standard values prescribed by law: 60% for air conditioners, 55% TVs, 50% refrigerators and 50% washing machines	Achieves 80% for air conditioners, 79% TVs, 61% refrigerators and 58% washing machines	◎	32, 33
	Establishing recycling system for information equipment	Home-use PCs (2002) Business-use PCs (2001)	Establishing business-use PC recycling system	100%	○	34
		Copiers: remanufacture/reuse (continued) Copiers: recycle (continued)	Recovering used copiers and reusing their parts	Used copiers: 10,472 units recovered	○	34
	Expanding container transports	Average of 330/month (2003)	Average of 182/month	Average of 255/month	◎	36
	Replacing by easy-to-recycle packaging materials	Using no Styrofoam for packaging goods lighter than 10 kg (2002)	Continuing to use no Styrofoam for packaging goods lighter than 5 kg	100%	○	37
	Holding environmental education, as well as general and specialist training at Sharp	1,500 general participants 300 specialists (2003)	750 general	319	×	38
			290 specialists	292	○	
	Community environmental activities	All domestic and overseas bases (every year)	All domestic and overseas bases	100%	○	39
	Publishing environmental report and exhibiting in environmental fairs	Preparing report by site and HP (2003)	Publishing environmental report, revising HP whenever needed, exhibiting in environmental fairs, etc.	100%	○	40

* Self Evaluation ◎Achieved more than targeted ○Achieved as targeted △Achieved more than 80% of initial target value ×Achieved less than 80% of initial target value

Special Edition

Realizing a Sustainable Society through

Sharp's Environmental Technology

As an electronics products maker, Sharp has been involved in the development of energy-creating and energy-saving products to help protect the environment. In the manufacturing process as well, we have been making strenuous efforts to preserve the earth's environment. These efforts are in the form of Sharp's unique environmental technology, put to use in plants throughout the world. The following is a brief introduction of our technological innovations.

Special Edition 1

Purifying Water with Bio-Power

Naturally purifying waste with a fluidized treatment system

Waste fluid treatment system at Fukuyama site

In-House Treatment of Used Developer to Produce No Polluted Mud

At the Fukuyama site where ICs are manufactured, we used to hire a subcontractor to incinerate spent developer, which makes up 70% of all our industrial waste. This method placed a significant burden on the environment, including the energy used for incineration and exhaust gas from the vehicles transporting the waste. Treatment costs swelled as production increased. It was a challenging issue for us, from both an environmental and managerial standpoint.

We at the Fukuyama site had been pursuing in-house treatment for spent developer, and we finally completed a fluidized waste treatment system using natural purification in 1996.

This system is based on a concept of purifying spent developer by natural processes. Built according to our proprietary design, it is a state-of-the-art system that produces no hazardous sludge during the treatment process.

Microorganisms Purify Water, Sustain Monitoring by Fish

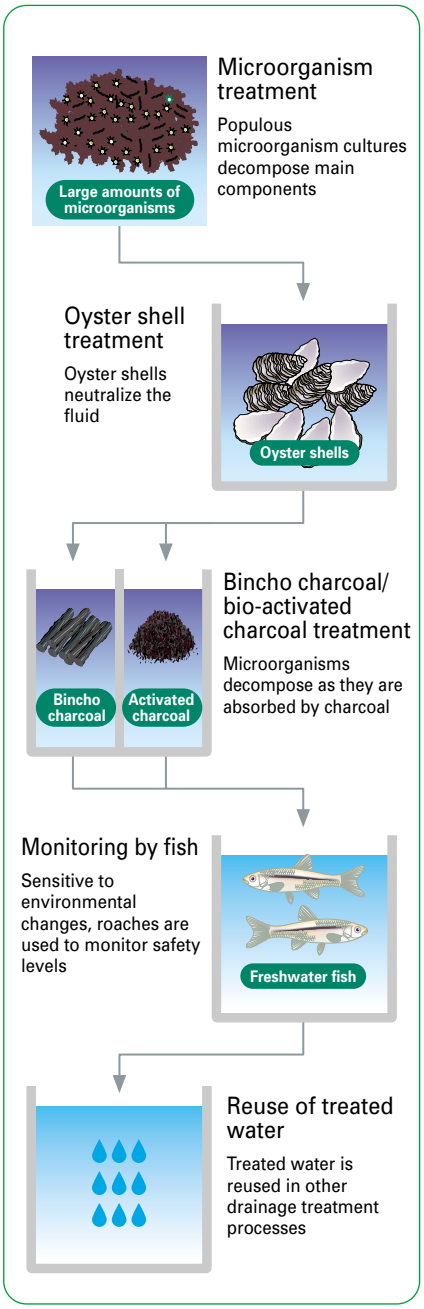
Sharp's system makes the maximum use of materials existing in nature. In the microorganism treatment process, microorganisms cultured to high levels of density are used to decompose most of the main components in spent developer that have strong alkalinity.

In the oyster shell treatment process, neutralizing treatment is carried out using a film of microorganisms that forms on the surface of oyster shells to decompose other organic substances.

In the Bincho charcoal/bio-activated charcoal treatment process, charcoal agents absorb a slight amount of the remaining organic substances. The charcoal is cleansed automatically, as the absorbed organic substances are treated by microorganisms growing on the surface of the charcoal.

In the fish monitoring process, in addition to measuring instruments, water safety is monitored with freshwater fish, such as roaches and Japanese bitterlings, which are sensitive to environmental changes.

● Fluidized waste treatment system using natural purification



The treated water becomes clean enough for environmentally sensitive freshwater fish to live in. (an image photo)

A Major Contribution to Management

Through the development of the fluidized waste treatment system, treatment costs have been reduced by approximately 1/30 compared to that of commissioned treatment.

Evaluated for its promotional efforts, the Fukuyama site received the 1997 Chairman's Prize and the 1999 Ministry of International Trade and Industry Prize, Recycling Promotion Achievement Award, from the Recycling Promotion Association.

Certificate of honor: 1999 Ministry of International Trade and Industry Prize from the Recycling Promotion Association

● Features of fluidized waste treatment system using natural purification

1. Based on microorganic cultures that exist in nature.
2. Maximizes use of materials existing in the natural world.
3. Complete decomposition produces no waste.
4. Spent developer is treated without using chemical agents.
5. Treated water is safe for the natural environment.

Message from our site

We developed the fluidized waste treatment system with a strong desire to leave clean rivers for future generations of children to enjoy. We acquired certification as an "environmental counselor," authorized by the Ministry of Environment in March 2002. We are also enthusiastically committed to educating the local community on environmental matters through this "natural pavilion" we've built here in Fukuyama, which is now open to all children.

Kazuyuki Yamasaki
Manager, Environmental Promotion Division,
Production Engineering Center,
Integrated Circuits Group

Special Edition 2

Making the Most Effective Use of Water Resources

Recovery effluents with a reuse rate of 92%

Effective use of water at Mie site

Clear Concept for Environmental Preservation

Our Mie plant is located 10 km southeast of Matsuzaka City in Mie prefecture. The nearby Kushida River is the source of drinking water for Matsuzaka citizens and is also used for local agricultural irrigation. Since LCD manufacturing requires a lot of water, drainage treatment is an important factor in environmental preservation in the neighborhood. We at the Mie site have improved significantly recovery and reuse of drainage from the production process under the concept of effective use of water resources. We thoroughly purify chemically treated drainage for reuse and do not discharge it outside of the plant.

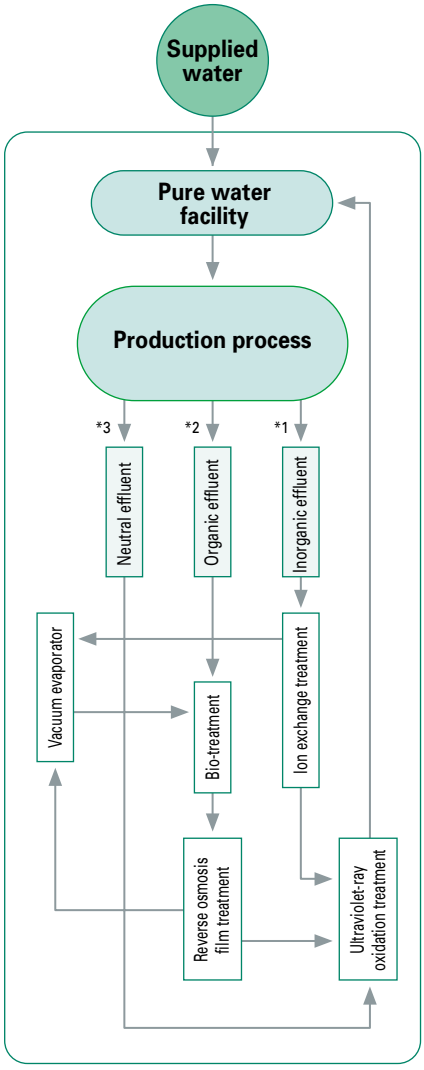
Effluent Treatment Facility Ensures Reuse Rate of 92%

Pure water used in the production process is classified into inorganic, organic and neutral effluents* before being discharged and recovered in a closed system for later reuse. When we began operations in 1995, we mainly recovered and reused inorganic effluent, which was believed to have a negative effect on the environment with a recovery rate of 30%. We had repeatedly evaluated treatment processes to recover and reuse organic and neutral effluents until 1996 when we introduced a new treatment process. This process utilizes microorganisms for the organic effluent and ultraviolet-ray oxidation treatment technology for the neutral effluent. This raised the recovery rate to 69%.

In constructing the Mie No. 2 plant, we included this process in the facility design stage, achieving a rate of 95% or more at the No. 2 plant alone, with a combined rate of 92% for the entire Mie plant in fiscal year 2001.

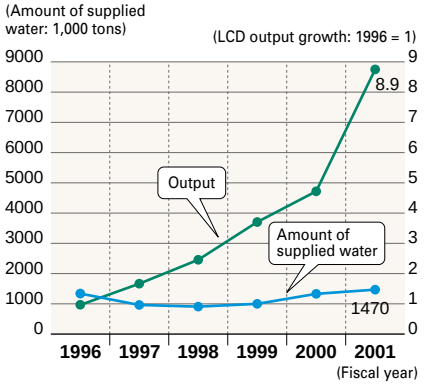
Improved effluent recovery and reuse rates help save industrial water (see chart in middle column).

● Closed system for water treatment



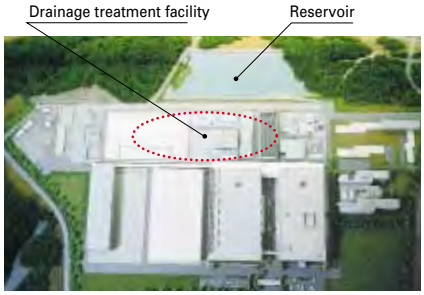
*1 Inorganic effluent: effluent containing acid, alkali
*2 Organic effluent: effluent containing alcohol, etc.
*3 Neutral effluent: effluent containing microscopic dust and dirt

● Annual changes in amount of supplied water and LCD output growth



Publicizing the Safety of Discharged Water through Plant Tours

We discharge cooling water into the Kushida River after treating it with activated charcoal. We check and monitor water quality around the clock, while watching water conditions in the neighboring areas. We offer tours of the plant to local residents to show that the discharged water is clean and safe. What is more, we have installed the entire piping assembly in a special channel which allows us to inspect it for chemical leaks on a daily basis, thus preventing soil and ground water from being polluted.



Drainage treatment facility and rainwater reservoir. The reservoir's pumping facility supplies 20,000 tons of rainwater annually.

Certificate of honor: The Mie site received the 3rd Japan Water Award, Promotion Prize sponsored by the Japan River Association

Message from our site

From my experience of having built six plants, I know that troubles and accidents must be taken care of in less than five hours. When it takes more than five hours, the risks to operations and the environment rise uncontrollably. I freely provide my extensive know-how to anyone who needs it, so that they can access and benefit from it immediately.

Ikuo Mizutani
General Manager,
Mie Environmental Promotion Center,
AVC Liquid Crystal Display Group

Special Edition 3

Preventing Gas from Polluting the Atmosphere

Fail-safe system responds to every possible problem and accident

Innovating Gas Processing Technology and Reinforcing Security Measures

Recently manufactured LSI circuits require a 0.13-micron* machining technique. This high-precision process requires the use of a gas dry-etching technique and a film-forming technique. Because some of the gases used in this process have toxic, corrosive or flammable properties, safety measures are a top priority for us.

* Minimum machining dimension of an IC. 1 micron is one thousandth of 1 mm.

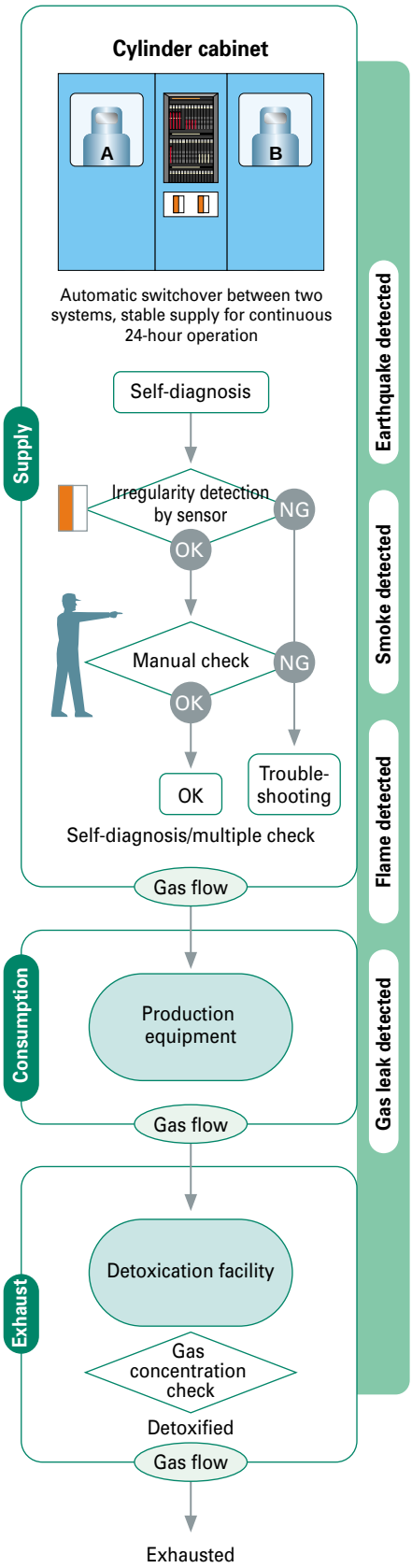
The cylinder cabinet is equipped with multiple sensors

Total Safety Control and Harmless Exhaust

Keeping in mind the fact that "mistakes do happen" and "all machines eventually deteriorate," we set up a system of gas safety measures. This system allows all information, from supply to exhaust, to be centrally monitored. This fail-safe system monitors the gas supply, consumption and exhaust for all facilities in order to prevent accidents if an operational mistake or malfunction should occur.

In the gas supply system for example, sensors that detect irregularities are mounted on the cylinder cabinets to monitor gas leaks, fires, etc. The system is also equipped with an interlocking function (automatic shutdown valve) to stop gas supply in case of disasters, accidents or malfunctions. Residual gas is detoxified and exhausted. This system complies to Sharp safety measure standards.

● Gas control chart



Gas safety measures at Fukuyama site

Safety: An Activity Created and Supported by All

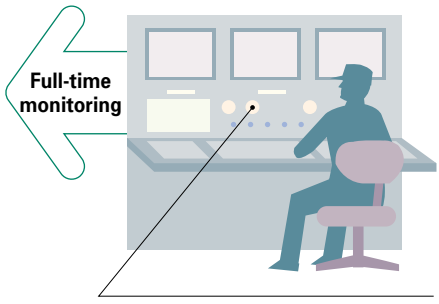
Sharp promotes safety from both personnel and organizational aspects so that all employees can support gas safety measures. We invite an outside specialist to give lectures at a safety education class held for all employees, not just the staff members who work with gases.

Some 160 employees from the Fukuyama site attend the seminar annually, and more than 2,000 people have finished the course. Certified personnel are allowed to supervise cylinder-replacement work that requires manual handling.*

* Cylinder replacement is performed by specialized subcontractor. Our employees only supervise the work.

Centralized Monitoring System

(Total control of supply, production and exhaust systems)



Alarm/Stop supply according to sensor-actuated alert level

Message from our site

The gas safety technique employed by our business group comes from a commitment of "never causing accidents." We are always paying close attention to the accidents in the rest of the industry and improving our capability, which makes a better guide for our system.

Kazuhiro Moritani
General Manager,
Production Engineering Center,
Department General Manager,
Production Innovation Promotion Division
Integrated Circuits Group

Special Edition 4

Pursuing Zero Discharge to Landfill

Total material recycling system

Recycling/reusing at Tenri site

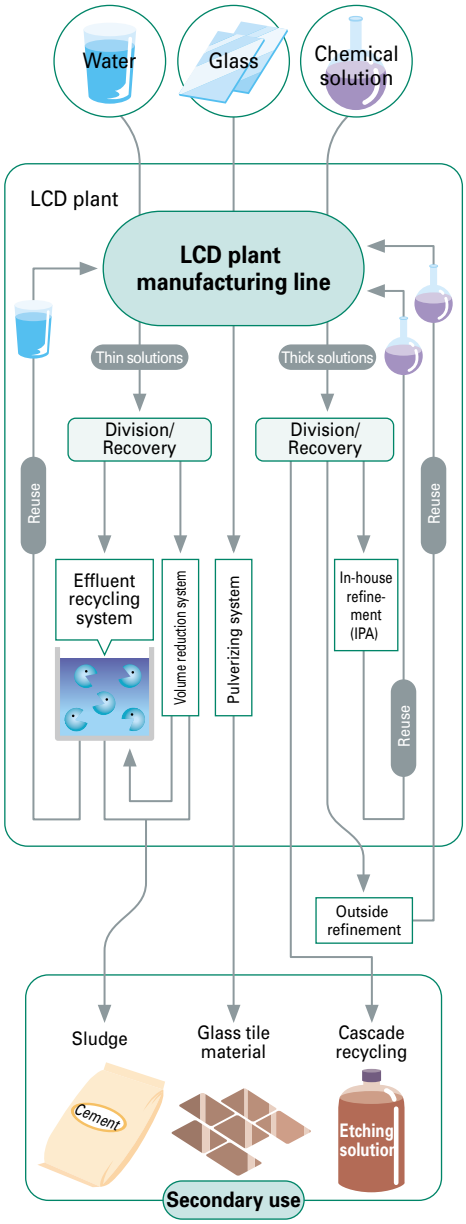
Recycle as Much Process Waste as Possible

Water, glass and chemical solutions are used in the LCD panel production process. If treated as industrial waste, these materials will place great burdens on the environment. Recycling them within the plant, however, saves the cost of treating and transporting them as industrial refuse and also saves on raw materials. Recycling allows us to create an ideal closed system with low burdens on the environment. Sharp LCD plants at Tenri site have constructed various recycling systems based on its advanced technology fostered over many years.

Total Material Recycling System

In addition to functional performance in development, etching and washing, Sharp seriously considers environmental burdens and recycling efficiency when selecting chemical solutions to be used in the manufacturing process. The chemical solutions divide into thick and thin solutions before they are discharged from the manufacturing process.
Thick solutions are refined at Sharp or at one of our subcontractors to be reused as chemical solutions. Some of the solutions are reused at our LCD plants, while others are diverted to other facilities for purposes such as fluoric acid-type etching solution, which is used for frosting glass products. In applying solutions for different purposes, we not only promote application development and market launch, but also push forward technological development to ensure high standards of product quality. Chemical components and sludge are removed from thin solutions through an effluent recycling system, and the solutions are then reused in the manufacturing process as industrial water. Waste glass is pulverized in the plant and shipped out as raw material for glass tiles.

● Total material recycling system for process waste



IPA (isopropyl alcohol) recovery/refinement system

Two Closed Recycling Systems Received Prizes from the Ministry of International Trade and Industry

At the Tenri site, two closed recycling systems received the Japanese Ministry of International Trade and Industry prizes.
One of these is an IPA (isopropyl alcohol) recovery/refinement system. This system aims at recovering and refining IPA (isopropyl alcohol), used in the TFT LCD manufacturing process as a finishing agent mainly for washing, so that it can be reused. We made the refining device small enough to install in the plant. The introduction of this device has reduced IPA consumption from 2,900 liters to 400 liters per day.
The other is a drainage recovery/reuse system containing DMSO (dimethyl sulfoxide). This system aims at cleansing the drainage that contains DMSO by means of a microorganism dissolving treatment so that recycled water can be reused in the manufacturing process.

Certificates of honor: The IPA recovery/refinement system and the DMSO drainage recovery/reuse system won the Ministry of International Trade and Industry Prizes at the 21st and 23rd Award for Excellent Environmental Equipment

Message from our site

I have long been involved in recycling water and chemical solutions used in plants. Individual recycling developments are supported by immense technological innovations and negotiations behind the scenes. To find the best solutions, I am trying to acquire a broad range of knowledge in various fields such as antiques, chemistry, biology, psychology and law.

Toshiaki Muratani
Chief Technical Research Fellow,
A212 Project Team,
Mobile Liquid Crystal Display Group

Environmental Report

Management

Planning and Design

Manufacturing

Recycle

Logistics

Mind-Set

Environmentally Conscious Management

1 Basic Environmental Policy and Organizational System

① Sharp Basic Environmental Philosophy (established in 1992)

Creating an Environmentally Conscious Company with Sincerity and Creativity.

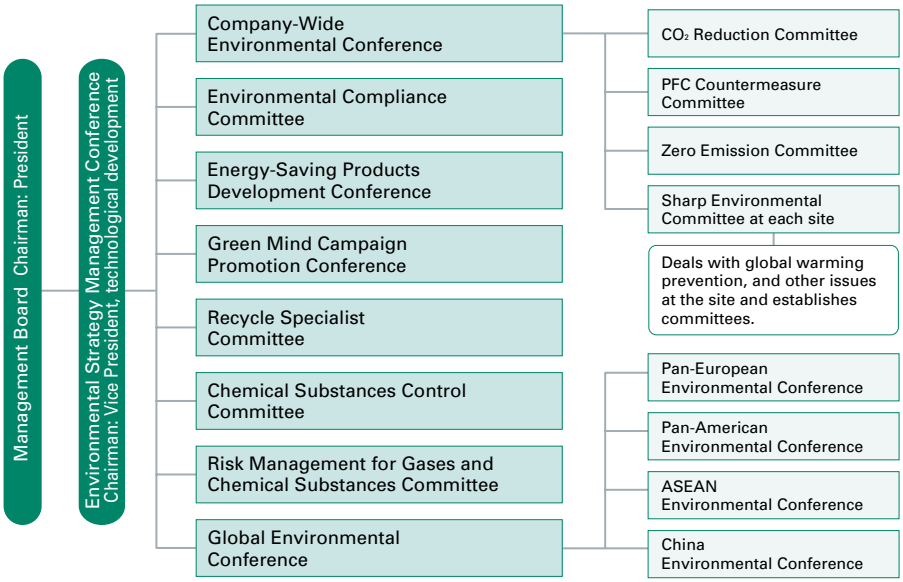
② Sharp Business Standards and Action Guidelines (established in 1998)

Business Standards	Action Guidelines
In addition to observing regional environmental laws and regulations, we use our own technology and knowledge to carry out activities dedicated to preserving the environment.	**(Preserving the global environment)** ● While respecting and abiding by the environmental protection legislation and agreements in their respective regions, offices will always promote natural resource and energy conservation practices. In addition, activities that prevent global warming and the depletion of the ozone layer will be conducted in striving to protect the earth. ● Proper management of chemicals used in research and manufacturing will be conducted in accordance with regulations or standards that surpass regulatory requirements. ● An international perspective will be adopted by receiving and reporting information while promoting communication with the public on environmental issues.
Introduce ISO environmental management systems in all worldwide manufacturing bases.	**(Implementation of the ISO14001 environmental management systems)** ● All manufacturing sites in Japan and worldwide will acquire ISO14001 Environmental Management System certification by a third party. In addition, all sales companies will strive to acquire certification. ● Certification for additional ISO standards (for example the LCA [Life Cycle Assessment]) will be actively introduced and certification pursued.
By promoting environmentally oriented business activities, we will contribute to building a society in which resources are recycled.	**(Development of environmentally conscious products)** ● Energy-efficient designs will be used as an integral part of continuing the development of smaller products that use the least amount of resources. ● Our products should not contain materials that destroy the environment and waste natural resources or contain toxic substances that are harmful to human health. ● Manufacture products that can be easily disassembled or that will naturally break down in the environment. This includes increasing the use of recyclable resources and materials. **(Environmentally conscious business activities)** ● Strive to prevent global warming by introducing energy-efficient equipment. ● Select only equipment, raw materials, additional parts and tools that do not adversely affect the environment, the people of the region where operations take place, and the employees. ● Increase recycling of waste products and give precedence to in-house disposal in an attempt to reach our goal of not relying on waste treatment companies for ultimate disposal.

③ Sharp Corporation Company Organization for Environmental Protection

The director in charge of environmental affairs plans and develops company-wide strategies concerning activities related to the preservation of the Earth's environment. Environmental supervisors are stationed at Sharp's headquarters and also at all sites to develop measures for environmental preservation. Important affairs, including strategies, guidelines and objectives, are determined at Environmental Strategy Management Conferences.
In fiscal year 2002, Sharp established a new "Environmental Compliance Committee" to consolidate the organization of this sector.

● Company-wide environmental protection organization



2 Environmental Management System

Objectives/ Plan	◎ Japan: Major bases of all sales/service companies to acquire ISO14001 integrated certification within fiscal year 2001. ◎ Japan: All production sites to acquire ISO14001 integrated certification within fiscal year 2002. ◎ Overseas: 31 bases (all overseas production sites and major sales companies) will acquire ISO14001 certification within fiscal year 2001.
Promotional Measures/ Achievement	◎ Japan: Major bases of all sales/service companies have acquired ISO14001 integrated certification. ◎ Japan: Environmental management manuals have been prepared for the integration of all production sites. ◎ Overseas: Four bases have acquired ISO14001 certification (total 29 bases out of 31 targeted bases).

① Establishment and Management of EMS

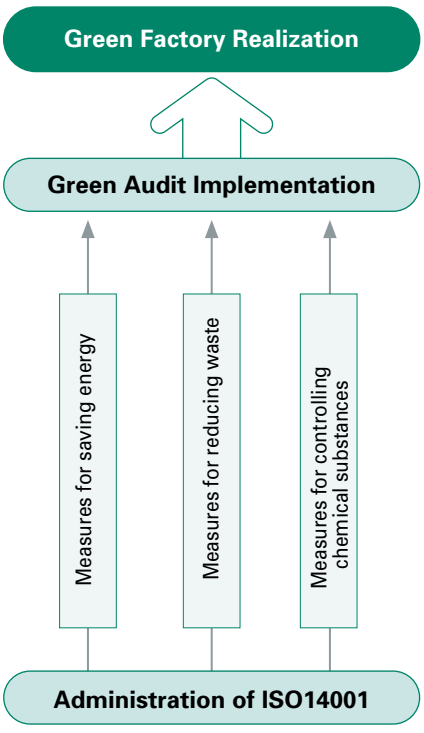
Sharp has established and manages its own version of the EMS standard, based on ISO14001 with additional environmental preservation efforts (chemical substance control, harmony with local community, and harmony with nature).
By the end of fiscal year 1997, all of Sharp's Japanese production sites acquired ISO14001 certification. Furthermore, with the aim of improving and universalizing our EMS, all Japanese production sites are striving to acquire integrated ISO14001 certification. We prepared environmental management manuals in 2001, and major bases of all Japanese sales/service companies acquired ISO14001 integrated certification. Four other overseas bases acquired ISO14001 certification. This means 29 out of 31 targeted bases have been certified. The remaining two bases will be certified within fiscal year 2002.

② Green Audit

As part of our efforts to realize Green Factories*, we introduced Sharp's original Green Audit into four bases in China, before introducing it into sites in Japan, in December 2001. Auditing covers a wide range of items, including planning and promoting volunteer action for environmental preservation, reducing highly harmful chemical substances, and promoting harmony with the local community and nature.
We will continue to move forward with auditing based on an Environmental Compliance Program.

* Sharp defines an environmentally conscious plant as a Green Factory.

● Green Audit



③ Environmental Solutions Business

Sharp has been enthusiastically offering support to a wide range of industrial customers through its long-acquired know-how in EMS improvement and managerial application. We have so far helped a total of 18 companies and institutions acquire ISO14001 certification, including schools, construction companies, industrial waste disposal subcontractors, and electronics manufacturers in Japan. We also hold training seminars such as general environmental seminars, intracompany environmental auditor's seminars, and intracompany chief environmental auditor's seminars, for our clients' corporate groups. In 2001, we set up a website for our environmental solutions business. In fiscal year 2003, we are planning to establish a comprehensive ISO solutions business, covering such areas as Information Security Management Systems and Occupational Health and Safety Management Systems, which are planned for standardization.

At the ISO intracompany environmental auditor's seminar

3 Environmental Risk Management

Objectives/ Plan	◎ Strengthen corporate compliance with laws. ◎ Educate all employees to strictly comply with environmental laws and regulations regarding products, industrial waste control, and chemical substance control, as well as adopt risk management for gases and chemical substances.
Promotional Measures/ Achievement	◎ Prepare for Environmental Compliance Committee (established in May 2002)

① Introduction of an Environmental Compliance Program

Sharp introduced an Environmental Compliance Program to strengthen its corporate compliance with laws in Japan.
The aim of this program is to establish an Environmental Compliance Committee and position it as the core of our environmental efforts. Through this committee, we will perform intracompany environmental compliance audits, strengthen environmental education and training, and revise manuals. Committee members will be selected from all related divisions and departments within the entire company. As part of our intracompany efforts to ensure environmental compliance, we plan to perform periodic compliance audits for environmental laws, ISO audits, and performance audits at our facilities in Japan. We plan to give training to our Japanese staff to reinforce domestic and overseas environmental law requirements and foster environmental morale, and also provide special genre subcommittees to discuss individual matters.

② Compliance with Environmental Laws

Sharp promotes business activities under a basic policy of complying with environmental laws and regulations. In addition to complying with laws regarding business activities and local agreement provisions, we implement stricter standards to prevent any violation. These in-company standards cover the latest trends in environmental laws and regulations.
In fiscal year 2001, it was brought to our attention that Kansai Recycle Systems Corporation, a recycling plant we consign to recycle our home appliances, discharged CFC into the atmosphere, which is a violation of the Home Appliances Recycling Law. Sharp and other consumer electronics manufacturers received a warning from the Ministry of Economy, Trade and Industry, and the Ministry of the Environment on March 20, 2002. As the company that has made the maximum investment in recycling plants, Sharp offers strong support in operational improvement to prevent problems from recurring.
(see page 33 for details)

● Role of Environmental Compliance Committee

Environmental Compliance Committee

Chairman: Director in charge of Environmental Matters
Secretariat: Environmental Protection Group
Members: All business groups, related divisions/departments in the headquarters

Discussion Themes at Environmental Compliance Committee

- Law and regulations on products/indication
- Preventing global warming (CO_2, PFC)
- Waste control
- Pollutant Release and Transfer Register (PRTR)
- Exhaust (offensive odors included)
- Effluent control
- Soil/underground water pollution
- Risk management for gases and chemical substances
- Other matters such as noise, vibration, etc.

Intracompany Audit

- Audit team
- Determining audit contents, items and targets
- Follow-up of audit results

Environmental Compliance Seminars

- Companywide compliance seminar (April) Seminars on disposal/cleaning laws, home appliances recycling law
- Environmental law seminar
- General environmental seminar, special seminar

4 Environmental Accounting System

Objectives/ Plan

◎ Continue use in Japan.
◎ Estimate the degree of social contribution toward energy saving and evaluating the effectiveness of environmentally conscious products.

Promotional Measures/ Achievement

◎ Environmental investment: 1,626 million yen
◎ Environmental costs: 10,308 million yen
◎ Economic effect: 1,320 million yen

① 2001 Result Overview*1

Period covered; April 1, 2001 ~ March 31, 2002
Summary points: Introduced from fiscal year 1999 in line with Ministry of the Environment guideline.

● Environmental protection cost (millions of yen, %: previous year)

Category		Investment*2	%	Expenses	%
Cost within business area	Pollution prevention	1,294	31.1	1,899	77.5
	Environmental protection	165	20.2	813	68.0
	Managing recycling of resources	142	176.6	1,283	88.4
	Total	1,601	31.6	3,995	78.4
Upstream and downstream cost		—	—	222	62.0
Administration cost		25	54.0	1,608	104.0
R&D cost		—	—	3,090	82.1
Social activities cost		—	—	1,208	261.5
Other environmental protection cost		—	—	185	96.8
Total		1,626	31.2	10,308	90.3

● Effects of environmental protection (quantitative %: previous year)

Details		Fiscal year 2001	%
Cost within business area	Amount of CO_2 emission per production unit	Product groups: 6.1t-CO_2/ 100 mill. yen	98.9
		Device groups: 69.4t-CO_2/ 100 mill. yen	133.8
	Amount of waste reused	128,507t	132.0
	Amount of landfill disposed	157t	9.3
Amount of polystyrene foam used		1,134t	84.7

● Monetary effects of environmental protection measures (quantitative %: previous year)

Details	Amount (millions of yen)	%
Cost reduction as a result of energy saving	738	76.0
Profits from sale of recyclable waste	434	67.4
Reduction in cost of disposing of waste	148	112.1
Total	1,320	75.6

*1 All comparative numerical values apply to eight domestic production plants, to ensure accurate evaluation in comparison with the previous year.
*2 Includes investment for environmental protection within business areas and environmental management software.

Environmental Protection Costs

- An increase in resources recycling investment was appropriated for the installation of a spent developer concentrator, a resources division/collection facility, and other equipment
- An increase in social activity expenses was appropriated for strengthening local environment beautification promotions and advertising for photovoltaic power generation systems.

Effect of Environmental Protection

Although CO_2 discharge (production units) increased, zero emission was achieved at all sites. We improved in environmental preservation effects for the second straight year.

Monetary Effects

Economic effects totaled 22,720 million yen, with the addition of tentative effects of environmentally conscious products that contribute to energy saving (see below). Although tentative effects are counted as presumed effects in the fiscal year 2002 version of the Environmental Accounting Guidebook compiled by the Ministry of the Environment, we omitted these effects from our calculations this year. That is because great care should be taken when calculating them, and the formulas have not been clearly specified.

② Estimating the Contribution of Energy-Saving Products to Energy Saving in Society

The degree of contribution to energy savings brought about by environmentally conscious products marketed by Sharp in Japan in fiscal year 2001 (including TFT LCDs, photovoltaic systems, energy-saving major appliances, consumer electronics products and others) amounts to 1,941 GWh*3 over the course of these products' lifetimes. This is equivalent to 21.4 billion yen, when calculated in terms of current electrical power costs in Japan.

*3 Data for calculation
- Energy saved by TFT LCDs (224 GWh)
- Formula: (Difference in annual power consumption when compared with CRT monitors) x (Production output of TFT LCD panels for PCs in fiscal year 2001) x 4.1 (average years of use)
- Formula for annual power consumption: As per the energy-saving catalog published by the Energy Conservation Center, Japan
  Years of use: The number of years before these devices are replaced by new ones, as described in a survey on consumption trends published by the Japanese Cabinet (March 2002)
- Energy generated by photovoltaic systems (1,432 GWh)
- Formula: (Annual power generation by photovoltaic systems produced in fiscal year 2001) x 17.6 (years of creating energy)
  Number of years during which photovoltaic systems keep creating energy: Years of service life (20 years) — payback time (2.4 years)
- Energy saved by major appliances and consumer electronics products, including air conditioners, televisions, VCRs and refrigerators (285 GWh)
- Formula: (Difference in annual power consumption when compared with their counterparts of the same class released in the previous year <intracompany data>) x (Number of units sold in fiscal year 2001) x (Years of use)
- Formula for annual power consumption: As per the energy-saving catalog published by the Energy Conservation Center, Japan
  Years of use: The number of years before the appliances are replaced by new ones, as described in a survey on consumption trends published by the Japanese Cabinet (March 2002)

Environmentally Conscious Products

1 Green Purchasing

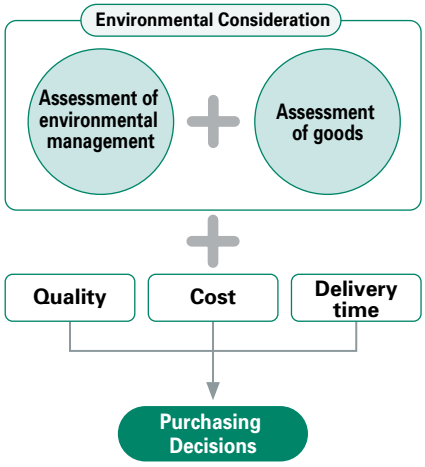
Objectives/ Plan	◎ Reevaluate unapproved domestic suppliers and D-ranked suppliers needing improvement as of fiscal year 2000. ◎ Introduce Green Purchasing system into overseas bases (Introducing into Malaysia in fiscal year 2001)
Promotional Measures/ Achievement	◎ D-ranked suppliers improved their environmental rating (all improved as a result of carrying out improvement efforts). ◎ Evaluating environmental considerations of 200 domestic suppliers and 156 suppliers of our Malaysian bases and feeding back evaluation results.

① Formulation of "Green Purchasing Guidelines"

From fiscal year 2000, identifying the "Green Purchasing Guidelines" which apply to all companies, we integrated our business partner "Evaluation of Environment Management" and "Evaluation of Delivered Goods" in order to promote parts and materials procurement which are considerate to the environment.
We rank our suppliers from A to D, using our proprietary scoring method. We ask D-ranked suppliers to improve their environmental efforts and reevaluate them the following fiscal year to confirm whether they have improved.

Green Purchasing Guidelines
(Japanese version/English version)

● Green purchasing standard, purchasing decisions



② Promotions in Fiscal Year 2001

In a Green Purchasing assessment conducted in August 2001, we evaluated exporters and new suppliers, and reevaluated D-ranked suppliers that were asked to improve in the 2000 assessment.
We asked D-ranked suppliers to submit an improvement program in fiscal year 2000. As a result of carrying out improvement promotions, 36.8% of those D-ranked suppliers were promoted to A, 55.3% to B and 7.9% to C. From this result, we confirmed that all our suppliers had improved their environmental efforts.
In October 2001, we introduced a Green Purchasing system into SEM*, our main overseas parts supplier, in Malaysia.

* SEM: Sharp Electronics (Malaysia) Sdn. Bhd.

③ Future Policies

We will review the standards and contents of the Green Purchasing system in order to perform checks mainly on the removal of toxic substances from parts and materials in and after fiscal year 2002.
We will additionally check for chemical substances targeted by the Japan Green Procurement Survey Standardization Initiative*.

Japan Green Procurement Survey Standardization Initiative:
A council through which Sharp and 17 other companies will endeavor to standardize Green Purchasing evaluation criteria for chemical substances contained in electric and electronic products.

● Evaluation items

Main Environmental Requirements	Main Product/Material Requirements
① Compliance with ISO14001 or EMAS*1 ② Corporate principles, policy, goals, organization, education, and training for environmental protection. ③ System for green purchase of parts and materials. ④ Disclosure of measures on environmental protection, activities, and their results. ⑤ Ability to supply MSDS*2 upon delivery of chemical substances.	① The items purchased are packaged in an environmentally conscious manner. ② Elimination of toxic chemical materials, including substances prohibited for use by domestic law; carcinogenic substances or substances having chronic toxicity; or chemical substances stipulated by environmental laws, major European laws or Sharp's internal criteria. ③ Working on resource saving such as reduction of used materials, use of recycled materials, implementation of recycle, etc. ④ Working on reducing power consumption in the making of parts or products.

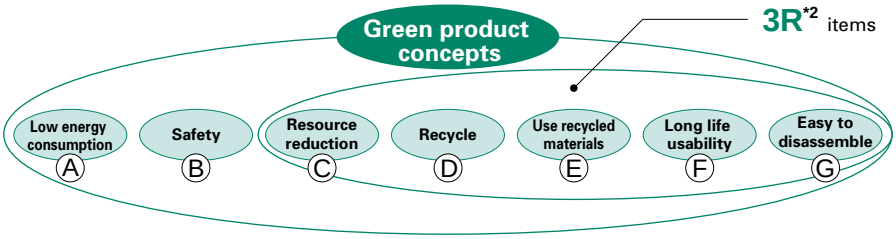
*1 EMAS stands for Eco-Management & Audit Scheme:
the environmental management system and auditing rules in the EU.
*2 MSDS stands for Material Safety Data Sheet:
it states the composition, toxicity, legal restrictions and appropriate methods of handling chemical materials.

2 Green Product Development Policy

1 Development Process

Our new products are developed according to the Sharp "Green Product Guidelines," which are based on seven concepts.
We introduced these guidelines to our domestic sites in 1999 and to our overseas production bases in 2001. In 2001, we improved and diversified the recycling items in time for the launch of the consumer electronics recycling plant. We will strengthen the guidelines and formulate seven concepts that will be observed by all employees.
Green Product Attainment is evaluated at three separate stages: planning/design, trial production, and mass production (final). Products receiving high marks are certified in Japan as "Green Seal Products." In fiscal year 2001, our objective was to achieve 75% of the goal*1—an objective we surpassed substantially by achieving 87.4%.
In fiscal year 2002, we plan to modify the guidelines by adding energy creation and comfortable life to the concept.

● Green product development process



Ⓐ **Products that are energy efficient and use little energy.**
Our focus is on products that consume less power both in running and standby mode, and air conditioners/heaters that give more efficient cooling and heating.

Ⓑ **Products that are safe to use and dispose of.**
We carry out tests on products that contain chemicals to make sure that they do not have negative effects on people's health or the environment.

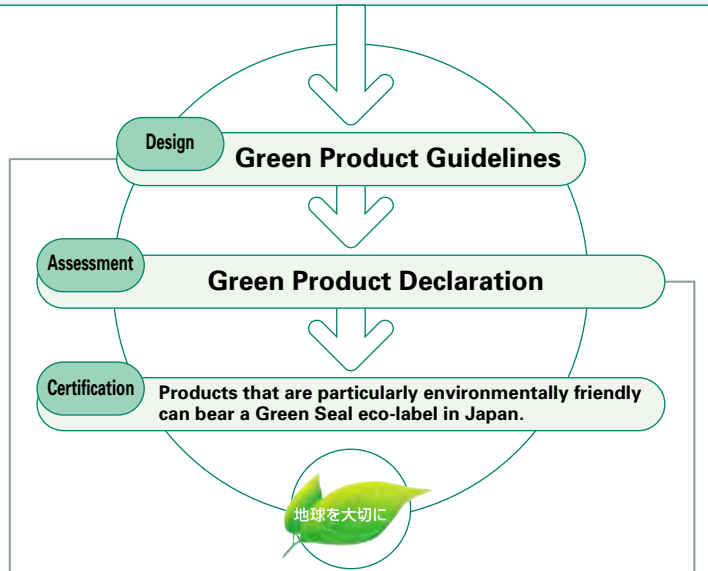
Ⓒ **Products that use minimum resources.**
We work to save natural resources like water, and to reduce the amount of materials used in products and packaging.

Ⓓ **Recyclable products.**
We choose materials that can be easily recycled or reused in products.

Ⓔ **Products made from recycled materials.**
We emphasize the use of materials such as recycled plastic in making products.

Ⓕ **Products with a long life cycle.**
Our goal is to design products that will last longer.

Ⓖ **Products that are easy to disassemble.**
We design and build products so that they will be easy to take apart for recycling.



● Green Seal products of fiscal year 2001

Industry's lowest power consumption (when released)
154W
LCD Television
AQUOS・LC-30BV3

Industry's lowest standby power consumption (when released)
0.17W
1-Bit Audio System **SD-CX2**

Uses green materials such as lead-free solder and non-halogen resin
ViewCam **VL-NZ10**

Green Product Guidelines

● Number of products that have acquired the Green Seal

Products	Number
Audio-visual	26
Home appliances	29
Communication equipment	17
Information equipment	40
Total	112

● Number of products that have passed the Green Products Declaration

Products	Number
Audio-visual	43
Home appliances	112
Communication equipment	31
Information equipment	77
Total	263

(Tageted 100 models, 112% achievement)

*1 Green Product Attainment: Average value of evaluation item achievement rates of models labeled as "Green Products" (all new products)
Evaluation item achievement rate = Number of items achieved/48 (all evaluation items) x 100%
*2 3R ● reduction of wastes (Reduce) ● reuse of parts/products (Reuse) ● recycling of materials (Recycle)

② Sharp Green Seal Program

Sharp certifies products that have excellent features, as “Green Seal Products,” especially those related to saving energy and resources, and marks them with its proprietary label—the Sharp Green Seal.
In fiscal year 2002, we plan to raise the certification standards and evaluation criteria.

The Green Seal

③ Introduction of Life Cycle Assessment (LCA)

Life Cycle Assessment (LCA) is a method to comprehensively evaluate the burden on the environment through the entire life cycle of a product from raw materials to production, sales, use and final disposal. Sharp has introduced LCA for our main Japanese product models to achieve the following objectives:
(1) To develop products with less burden on the environment,
(2) To improve production processes.

In fiscal year 2001, we evaluated solar cells, air conditioners and mobile phones in terms of their effects on global warming.
Because solar cells create energy without discharging carbon dioxide, the more we use them the less burden we place on the environment.
(See diagram: -1014.5 kg-CO_2)
We realize that air conditioners need improvements in energy-saving performance, since they discharge much carbon dioxide during use.
Mobile phones can be regarded as products that place low burdens on the environment, since they discharge only an extremely small amount of carbon dioxide.
We have been considering a new evaluation protocol for our design engineers to use, since the present LCA evaluation requires too much time and labor to collect data.

● Green seal product certification standards in fiscal year 2001

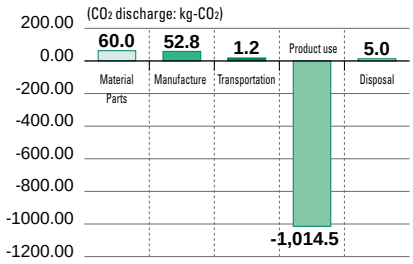
Certification items		Detail
Saving energy	Power consumption	• Industry-leading model of each product category
	Standby power consumption	• Industry-leading model of each product category • 0.1 W or less (remote-controlled products) • 1.0 W of less (telephones, facsimiles, PCs)
Saving resources	Resource savings during use	Industry-leading model of each product category (water, detergent savings, etc.)
	Compact/lightweight	• Industry-leading model of each product category • Reduced by 30% or more when compared to previous models
Long service life	Upgrading	• Upgradeable products (excludes upgraded PC software, HD, memory, etc.)
	Long-lasting consumable supplies	• Products having improved consumable supply life of 50% or more
Reuse	Reusing parts	• Products with parts reusing established system
Recycle	Highly recyclable materials	• Products using highly recyclable materials
Safety	Green materials	• Lead-free solder, abolishing use of halogenated flame retardants, substituting polyvinyl chloride (power cords excluded)
Awards	Honored by public organizations	• Won Energy-Saving Award, New Energy Award, etc.
Eco Mark	Acquired Eco Mark	• Products that acquired Eco Mark authorized by the Japan Environment Association
Others	Original technology	• Industry-first technology and other Sharp-original technologies, the environmental consideration of which can be evaluated objectively

● LCA results of environmental impact (on carbon dioxide emission)

Solar Cell Module

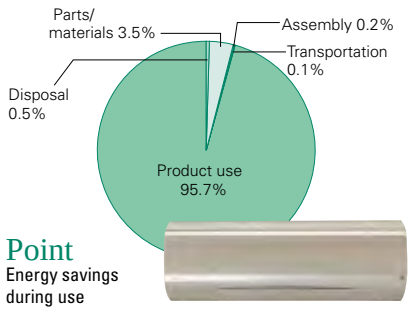
NE-130AH
(54 polycrystalline modules connected in series)

Point
The more they are used the less burden is placed on the environment.



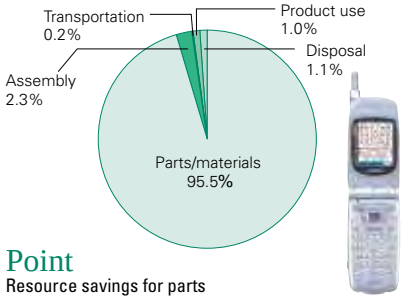
Notes: 1. Calculated per module 2. Not including stand, power conditioner, cable, etc. 3. When used for 20 years 4. Usage figures calculated by multiplying the average amount of power generated in Japan by the amount of CO_2 discharged for commercial-use power.

Air Conditioner **AY/AU-M28SC**
CO_2 discharge 4,023.6kg-CO_2



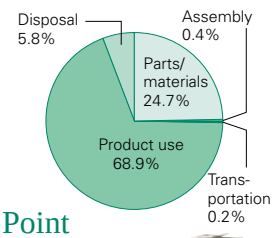
Point
Energy savings during use

Mobile Phone **J-SH07**
CO_2 discharge 57.9kg-CO_2



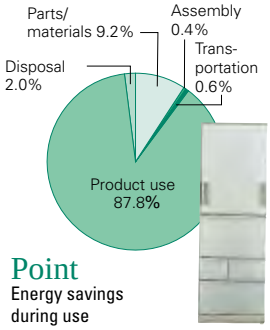
Point
Resource savings for parts

Copier **AR-S330**
CO_2 discharge 591.6kg-CO_2



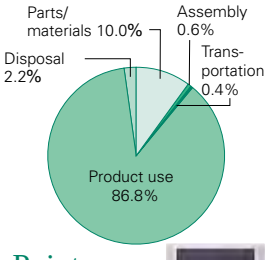
Point
Resource savings for parts and energy savings during use

Refrigerator **SJ-WH40E**
CO_2 discharge 1,784.4kg-CO_2



Point
Energy savings during use

TV **21C-FA1**
CO_2 discharge 504.5kg-CO_2



Point
Energy savings during use

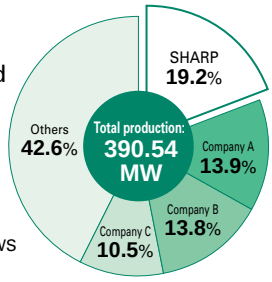
3 Developing Energy-Creating/Comfortable Life Products

① Energy-Creating Products

Solar Cells – World's Largest Output

With the output of its 2001 solar cells reaching 75.02 MW, and accounting for 19.2% of global production, Sharp topped the world market share for the second straight year, after achieving a share of 17.5% in 2000. Sharp will continue to promote the increased use of photovoltaic power generation in its effort to preserve the earth's environment.

● Solar cell output and world market share in 2001



Source: PV NEWS

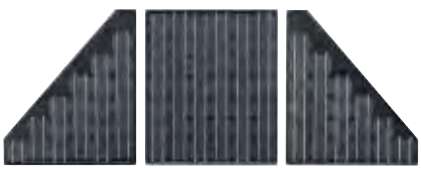
Color solar cell modules marketed

(Made to order)

Residential Photovoltaic Power System

(SUNVISTA)

Sharp's fiscal year 2001 model photovoltaic power generation system for residential use, which features triangle corner modules for neat and efficient installation on hipped roofs, received the 2001 Japan New Energy Award. An apartment complex in Japan equipped with a Sharp photovoltaic power generation system also received a New Energy Award.



NT-051BL・NT-102BC・NT-051BR
These modules can be laid out to fit the shape of most roofs

② Comfortable Life Products
(Creating a comfortable, healthy and cozy living environment)

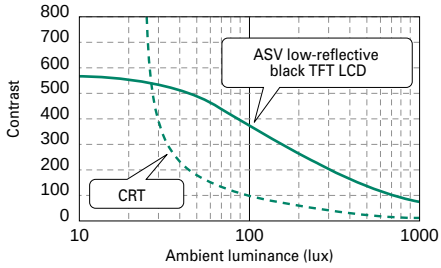
Wide-Screen LCD TV

(AQUOS)

This unique liquid crystal panel television was developed with special regard to TV broadcasting and audio-visual software reproduction. Its low-reflection screen maintains a high contrast even in brightly lit living-rooms, resulting in a clearer picture. In addition, the absence of flickering on the scanline results in less stress for the eyes even during long stretches of close viewing. These innovations provide viewers with a lively, realistic viewing experience.

LC-30BV3

● Comparison of picture contrast between LCD and cathode ray tube (CRT) technology

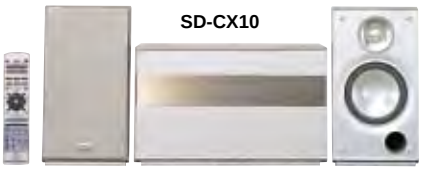


The luminance of a living room in an average household is said to be about 300 lux. With an ambient luminance of 30 lux or more, CRT contrast is sharply reduced, while LCD maintains a high contrast level.

1-Bit Digital Audio

(AUVI)

Sharp's 1-Bit digital amplifying technology not only reproduces sound as faithfully as possible to the original but also enables energy savings with a digital amplifier featuring high-efficiency electrical power conversion.



SD-CX10

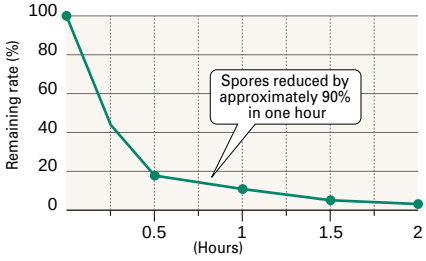
Air Conditioner

("Plasmacluster" Ion Air Conditioner)

The Plasmacluster Ion generator built into this air conditioner cleans room air by emitting positive and negative ions. These ions effectively dissolve floating mold spores, and viruses and harmful substances contained in tobacco smoke such as NO. Sharp's original energy-saving design has enabled it to lead the industry in energy-saving performance.

AY-N28XC

● Initial test results for performance in removal of airborne spores



- Operating mode: Plasmacluster Ion independent operation
- Indoor temp./humidity level: 25˚C/42% RH
- Measuring method: Measured by counting the number of floating spores with an air-sampler, approximately 2 m from the air vent and approximately 1.3 m above the floor surface.
- Testing institution: Ishikawa Health Service Association

Automatic Washing Machine

A built-in ultrasonic vibrator removes heavy soil from shirt collars and cuffs with approximately 100 times* the washing power as the previous model. Users can then select a "detergent-saving" wash mode or a "water-washing" mode that uses no detergent, further reducing the burden on the environment.

* When comparing cleaning effectiveness between ultrasonic washing and conventional fully automatic washing machine.

ES-U80C/ES-U70C
Ranked No.1 in the New Products category by Nikkei Research Institute of Industry and Markets

4 Developing Energy-Saving/Resource-Saving Products

Objectives/ Plan

◎ 100 models to acquire Sharp Green Seal, achieving 30% sales component ratio.
◎ Create industry-leading energy-saving products.

Promotional Measures/ Achievement

◎ 112 models acquired Sharp Green Seal, achieving a sales component ratio of 32.2%.
◎ Released 63 models of industry-leading energy-saving products in Japan.

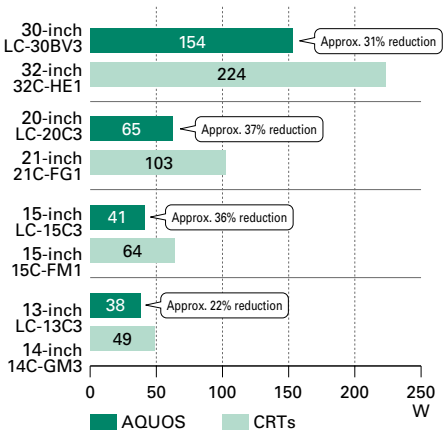
① Energy-Saving Products

AQUOS

AQUOS LCD televisions outperform CRT televisions in energy savings and service life. They are also lighter and thinner. In addition to a long-life LCD screen, the backlight gives approximately 60,000 hours of service life, long enough to be viewed eight hours per day for approximately 20 years.

LC-20C3-S

● Comparison of power consumption in AQUOS and CRT televisions (Sharp comparison)



Microwave Oven

The introduction of a 1000W inverter heater has reduced heating time by approximately one third and reduced electrical power consumption by approximately 42 percent*. An auto power-off feature has also been added.

* Comparison with the Sharp conventional model RE-EM5

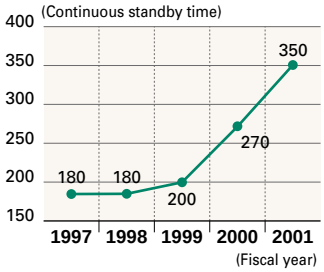
RE-RZ1

Mobile Phones

The advanced color TFT LCD in Sharp's mobile phone can be switched from 'Reflective Type' for use outdoors and in bright locations, to 'Transmissive Type' with a backlight for use in dark locations, which helps save energy. The built-in CMOS camera module and charger are also designed to save power, providing users with approximately 130 minutes of continuous operation time and a continuous standby time of approximately 350 hours.

J-SH08

● Longer mobile phone standby time



② Resource-Saving Products

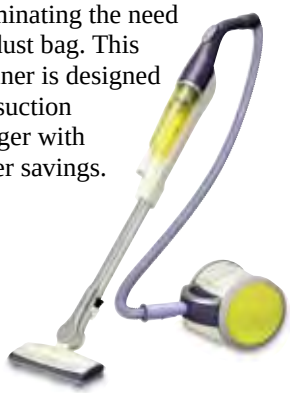
Notebook PC

Using thin-format LCD panels and incorporating a magnesium interior frame, this notebook PC features an ultra-thin, lightweight design. Materials with high recycling efficiency such as aluminum alloy and magnesium alloy are used in the cabinet and frame.

PC-MT1-H5
An ultra-low power consumption CPU helps the battery last longer

Cyclonic Vacuum Cleaner

Using lightweight materials for the dust cup and main unit and the world's thinnest hose, Sharp has developed a vacuum cleaner that is approximately 30% lighter than conventional models. Dirt is sucked directly into the dust cup using a centrifugal separation method, eliminating the need for a paper dust bag. This vacuum cleaner is designed to maintain suction capacity longer with greater power savings.



EC-AP1

5 Development of Products that are Safe to Use and Dispose

Objectives/ Plan

◎ Use lead-free solder in all new products produced in Japan starting from April 2001.
◎ Reduce use of halogen compounds.

Promotional Measures/ Achievement

◎ Used lead-free solder in 45 product models produced in Japan; used lead-free solder in all circuit boards of 26 of these 45 models.
◎ Introduced non-halogen compounds housings for personal computers, LCD TVs, etc in Japan.
◎ Used cords without lead or cadmium.

① Promoting the Use of Lead-Free Solder

Exposure to heavy metals such as lead and cadmium can affect the central nervous system when accumulated in the human body and can stunt growth in children. Sharp is striving to introduce lead-free solder on a company-wide basis. Tin, silver and copper solders are now used in the normal manufacturing process at Sharp, and PCs with printed circuit boards having lower heat resistance use lead-free solders with a lower melting point, such as tin, zinc and bismuth. In 2001, which was the first fiscal year we introduced lead-free solder, Sharp used it in 45 models of new products. Beginning in 2002, we are planning to use lead-free solder in all our products manufactured at worldwide sites, based on the "Lead-free solder introduction guidelines" (March 2001).

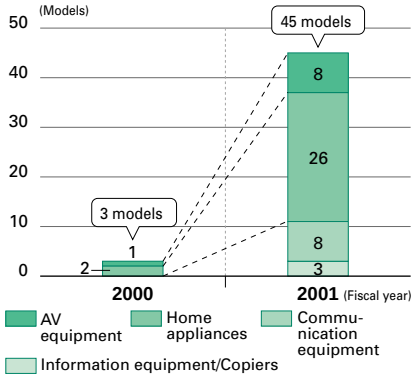
Lead-free solder introduction guidelines

● The Lead-Free (LF) Mark is placed on lead-free soldered mounted boards

LFa
Sn-Ag-Cu

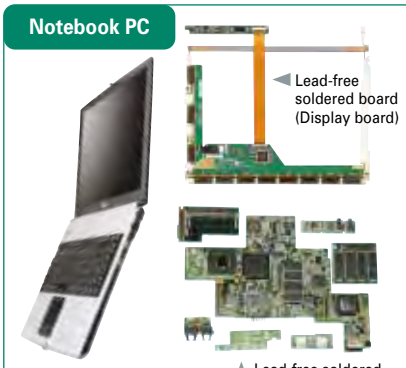
Our original LF mark is shown on lead-free soldered circuit boards for the following reasons:
① To prevent the mixing of different solders in case of repair or replacement, and to ensure optimal connections.
② To prevent harmful disposal.

● Comparison in number of models using lead-free solder (fiscal year 2000 and 2001)



● Products with lead-free solder

Notebook PC



PC-MT1-H5F

Facsimile machine

UX-W90CL

② Reduction of Halogen Compounds

Halogen compounds contained in plastic cases and printed circuit boards are flame retardant. We are eliminating the use of halogen compounds that may generate dioxins under certain conditions of incineration.

③ Employing Lead-Free/Cadmium-Free Cords

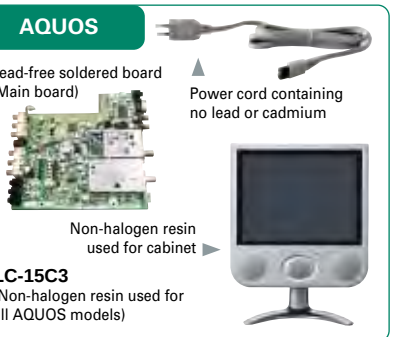
Polyvinyl chloride shielding materials for power cords contain a slight amount of lead or cadmium as an additive to facilitate machining and allow greater flexibility. We started replacing them with shielding materials containing no lead or cadmium in fiscal year 2001.

Vacuum Cleaner

Cyclonic vacuum cleaner using non-halogen compound resin for hose and bumper of suction section

EC-AP1

AQUOS



LC-15C3
(Non-halogen resin used for all AQUOS models)

6 Product Development Complying with 3R* Objectives

Objectives/ Plan	◎Create a practical recycling technology for plastics (polypropylene resin). ◎Design parts with ease of disassembly for recycling. ◎Start reusing parts in new products.
Promotional Measures/ Achievement	◎Use of recycled materials for the water tub of washing machines (ES-U70C/U80C). ◎Develop easy-release screws made of shape-memory alloy or resin. ◎75% parts used in remanufactured copiers (SD-2150R) were reused parts.

① Preparing Recycle Design Guidelines

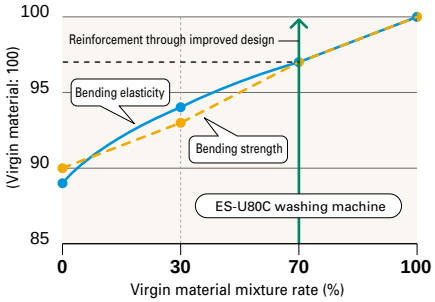
To promote product design that facilitates recycling, Sharp has established a Recycle Design Development Project, consisting of product design engineers, recycling technology developers and consumer electronics recycling plant line engineers in Japan.
At project meetings, we choose examples from recycling sites and discuss how to make disassembly easier, employing easier-to-recycle materials.
We compiled our discussions in the Guidelines for Recycle-Conscious Product Design, completed in December 2001, and introduced them to our domestic product design divisions. The guidelines describe design techniques to improve the recycling rate, with illustrated examples of disassembling processes and disassembly difficulties.

Guidelines for Recycle-Conscious Product Design

② Making Polypropylene Material Recycling Technology Practical

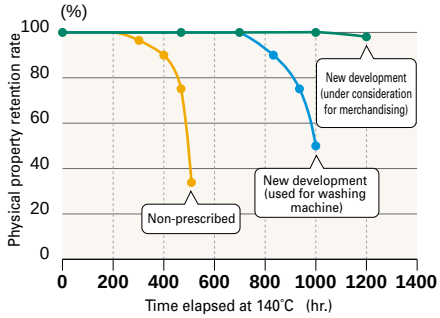
Sharp has been involved in developing recycling technology for plastics since 1999. In fiscal year 2001, we disassembled used washing machine tubs and reduced them to their constituent materials, thereby developing a practical technique for making the recycled materials into new water tubs. (ES-U70C/U80C)
Service life and durability of recycled materials were major hurdles for us to overcome in developing recycling technology. By using antioxidants and other additives to prevent aging, we were able to improve the service life of the recycled materials. And by blending virgin materials, we improved their ability to withstand shock and bending. We also studied shock resistance by drop testing to improve structural design. As a result, we achieved a level of strength equivalent to that of virgin materials.
We will further encourage the development of environmental and recycling technology in partnership with outside research institutions and universities.

● Improvements in physical properties by mixing with virgin materials



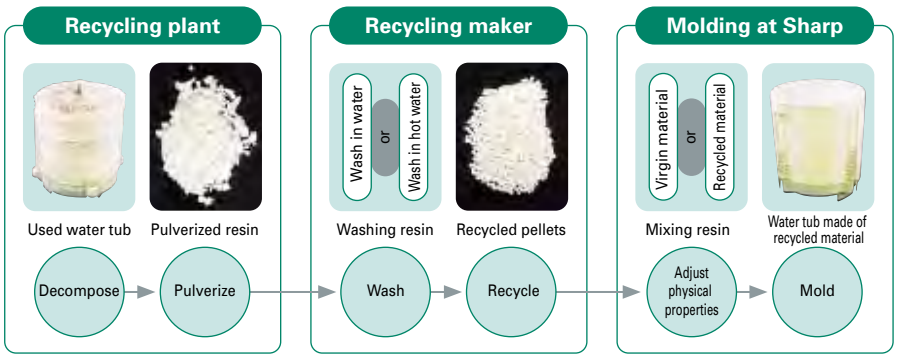
Mixing virgin materials with the recycled material improved the stretching and bending strength.

● Improving service life by adding antioxidant



Adding an antioxidant to the recycled material prevented it from aging, giving it a longer service life.
Note: Tests conducted on 100% recycled materials

● Washing machine recycle flowchart



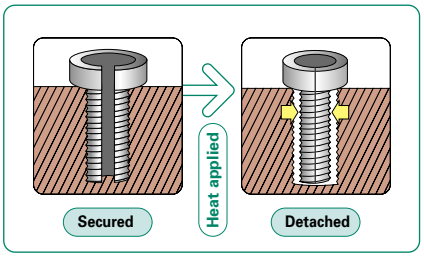
* 3R
- Reduction of wastes (Reduce)
- Reuse of parts/products (Reuse)
- Recycling of materials (Recycle)

③ Parts Design Taking Disassembly into Account

Sharp has improved the disassembling efficiency of copiers, which are composed of many parts, by combining the parts into single units to make them easier to recycle and reuse. What's more, by combining and adding assemblies according to user needs, customers are able to use the product longer. We also select functions as needed to make more effective use of resources.
Furthermore, as one of our special recycling efforts, we have developed special screws* made of shape-memory alloy or resin that can be disengaged through a simple heating method. This allows products using the screws to be disassembled in about half the time normally required. In the future, this technological development will make it possible to operate the disassembly line unmanned. We are now working to equip LCD products with shape-memory screws by 2005.

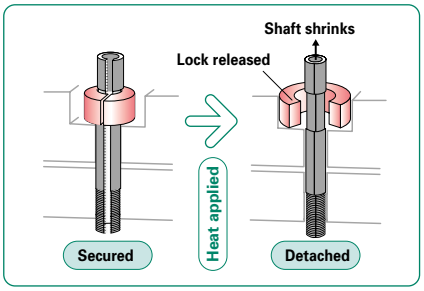
* Jointly developed with NEC Tokin, Inc. as a research business commissioned by the Manufacturing Science and Technology Center, Ministry of Economy, Trade and Industry.

● Easy-release screw (Example 1)

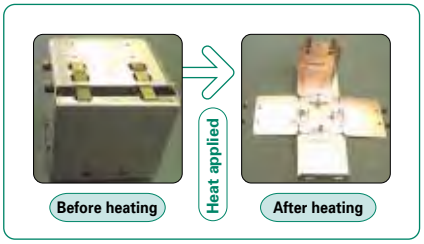


A cylindrical slit screw made of shape-memory alloy is heated to shrink to a reduced diameter for easy removal.

● Easy-release screw (Example 2)



● Example of disassembling a cabinet using easy-release screws



A cabinet using these screws can be disassembled without manual labor

④ Remanufacturing Copiers

Sharp has been actively developing a copier remanufacturing system in Japan since 1997. The system is set up to recover a used machine, disassemble all its individual parts after a status check, wash them, put them back in the production line after close examination, and add new parts to assemble a machine that has the same quality and performance as one manufactured completely from new parts. More than 75% of SD-2150R copiers are manufactured from recycled parts.
Sharp began production of remanufactured copiers bound for overseas markets in fiscal year 2001, and shipped a total of 680 units (three models: 25 cpm, 30 cpm and 40 cpm machines) to its sales subsidiaries and dealers in Southeast Asia, Africa and the Middle East. These remanufactured models are equivalent in performance and reliability to new models for the Japanese market.

Sharp has now shipped nine models of remanufactured copiers, including six for the Japanese market and three for overseas markets.

7 Acquiring Environmental Labels

Environmental labels are affixed to products that have cleared the standards instituted by a third party organization to acknowledge that the products are environmentally friendly and that their environmental information is open to the public. Sharp is enthusiastically striving to obtain various kinds of environmental labels in countries around the world and to provide environmental information on its products.

● Acquired environmental labels worldwide (the number of models acquiring environmental labels in fiscal year 2001)

International Energy Star Program (Countries: Japan, US, EU nations, etc.)

PCs	TVs	Copiers	Printers	Facsimiles	Monitors	Air Conditioners	VCRs	LCD TVs	Audio Systems	VCR/TV Combos	VCRs/ DVDs
40	40	32	18	14	10	6	6	6	6	2	1

Eco Mark (Country: Japan)

Copiers	Printers	Calculators
12	7	2

GEEA Label (Countries: EU nations)

VCRs	LCD TVs	Audio Systems
15	7	20

Hong Kong Energy-Saving Label (Country: Hong Kong)

Digital Copiers	Copiers
3	1

Environment Choice Program (Country: Canada)

Printers	Copiers
4	2

Nordic Environmental Label (5 Europe countries*)

Printers	Copiers
4	3

Thailand Green Label (Country: Thailand)

Refrigerators
14

Energy-Saving Label (Country: China)

Refrigerators
8

PC Green Label (Country: Japan)

PCs
23

*Sweden, Finland, Norway, Iceland, Denmark

Environmentally Conscious Factories

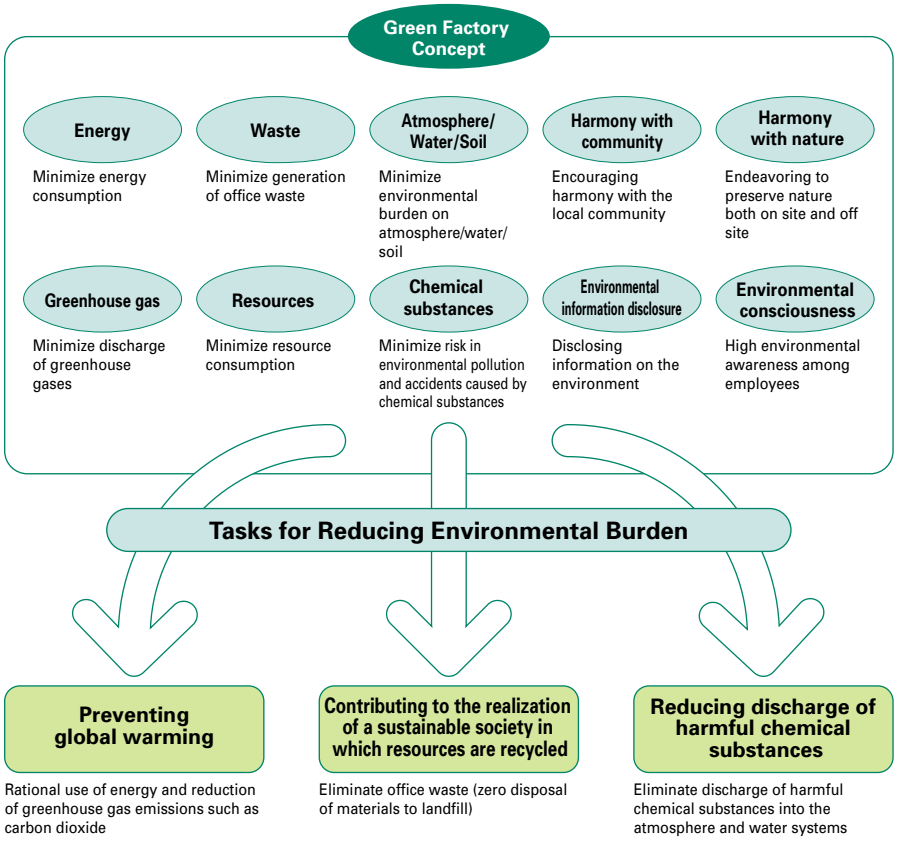
1 Guidelines for Promoting Green Factories

① Green Factory Concept and Guidelines

The Green Factory Guidelines require compliance with environmental laws and regulations applicable to each facility, establishment of an ISO14001-based environmental management system, and attainment of targeted values for environmental performance. The guidelines have proprietary environmental preservation activities added, including maintaining harmony with the local community and harmony with nature. The guidelines cover ten concepts and focus on preventing global warming, contribution to the realization of a sustainable society in which resources are recycled, and reducing the discharge of toxic chemical substances. Sharp has been following the guidelines ever since the company introduced them to all manufacturing sites in Japan in fiscal year of 1999.

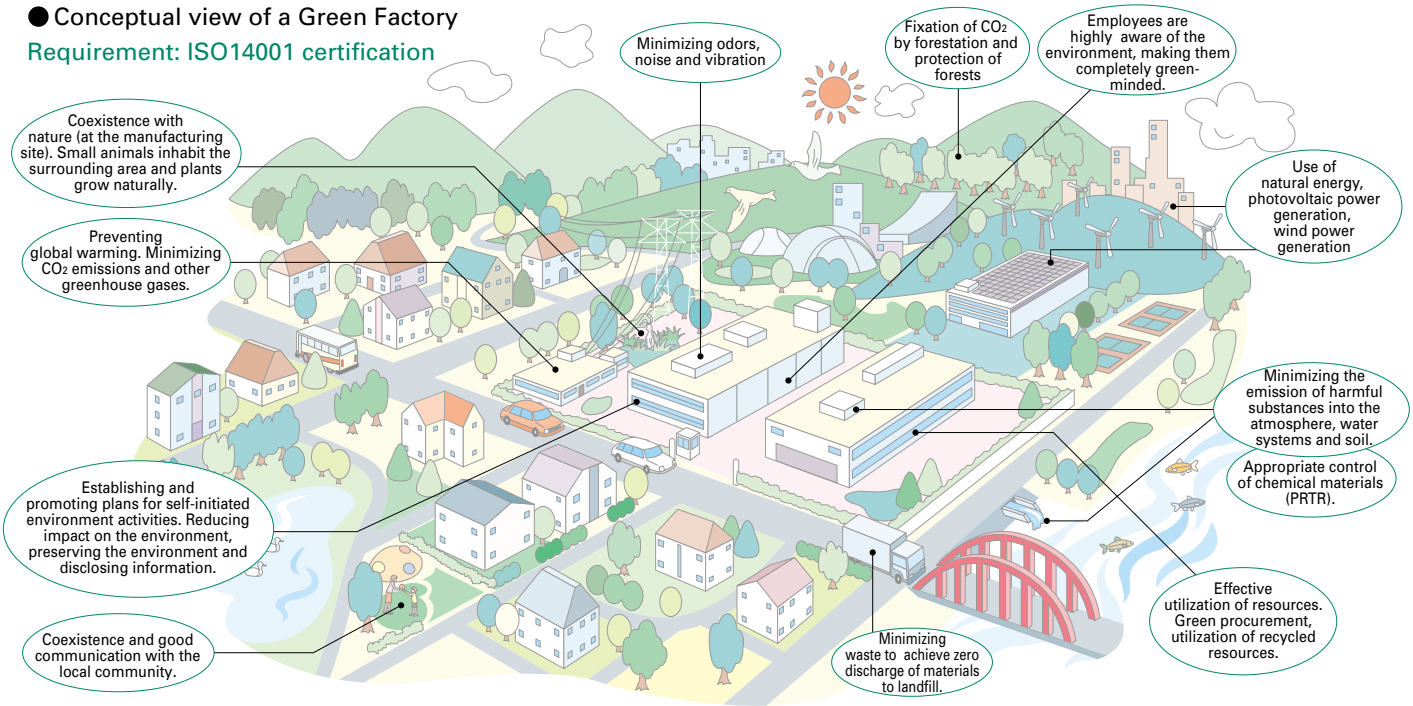
Green Factory Guidelines

● Reducing Environmental Burdens with the Green Factory Concept



● Conceptual view of a Green Factory

Requirement: ISO14001 certification



Note: Matters relating to regional harmonious coexistence, environmental information disclosure, harmonious coexistence with nature and environmental awareness are introduced at the Mind-Set Stage.

2 Preventing Global Warming

Objectives/ Plan	◎ Japan: Reduce CO_2 emissions per production unit at product production sites by 2% yearly and at device production sites 5% yearly. ◎ Overseas: Reduce CO_2 emissions per production unit yearly by 2% based on fiscal year 2000 levels.
Promotional Measures/ Achievement	◎ Japan: 20% increase of production units compared to previous year (1.1% reduction at product production sites and 33.8% increase at device production sites). ◎ Overseas: 2.1% reduction of production units compared to previous year.

1 Reducing CO_2 Emissions at Production Sites in Japan

As part an international movement to prevent global warming, Japan has ratified the Kyoto Protocol. Sharp takes preventing global warming seriously, and is actively implementing measures to reduce emissions of CO_2 (energy consumption levels).
Carbon dioxide emissions at production sites in Japan in fiscal year 2001 were 351,264 tons, a 0.6% reduction from the previous year. 1.1% fewer production units were produced at product production sites than the previous year, but there was a 33.8% increase of production units at device production sites, resulting in an overall production increase of 20%. Total emissions at device production sites have been controlled in line with the previous year, but since overall production has decreased, this actually amounts to a significant increase in emissions per unit. (see fig. 1.)
CO_2 emissions from all production sites and offices in Japan, including the company headquarters and Tokyo branch, rose by only 1% compared to the previous year in fiscal year 2001, whereas in fiscal year 2000 emissions levels had risen by 7% from the previous year. (see fig. 2.)
This success in reining in overall emissions at our production sites is a result of energy-saving strategies enacted at each site individually, as well as the activities of our "Energy-Saving Work Group," whose mission is to save energy on the supply side as well as the demand side through efforts such as the improvement of energy efficiency of our production facilities.
Sharp will continue to actively strive to reduce its CO_2 emissions in the future, but when new factories come on line, an increase may also be expected. Thus, we are putting more effort into finding ways to reduce greenhouse gases other than CO_2, such as PFCs. We will also use the Kyoto Protocol as the basis for other efforts to preserve the environment, including the planting of forests.

Figure 1

● CO_2 Emissions and Production Units by Business Category in Japan

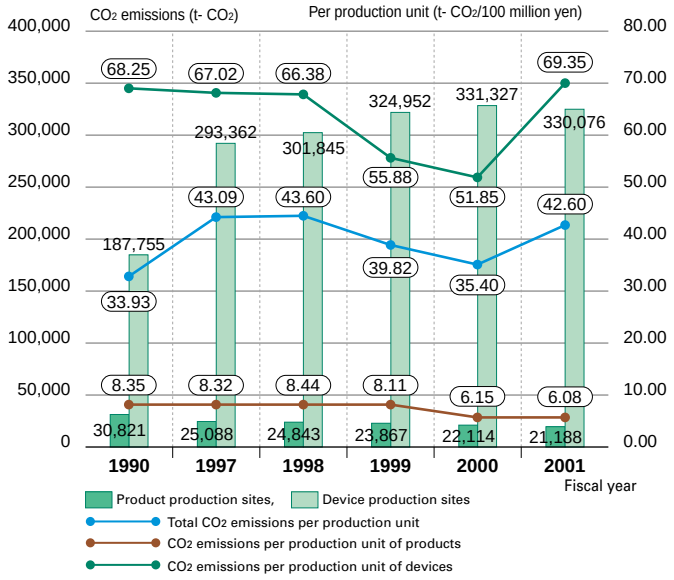
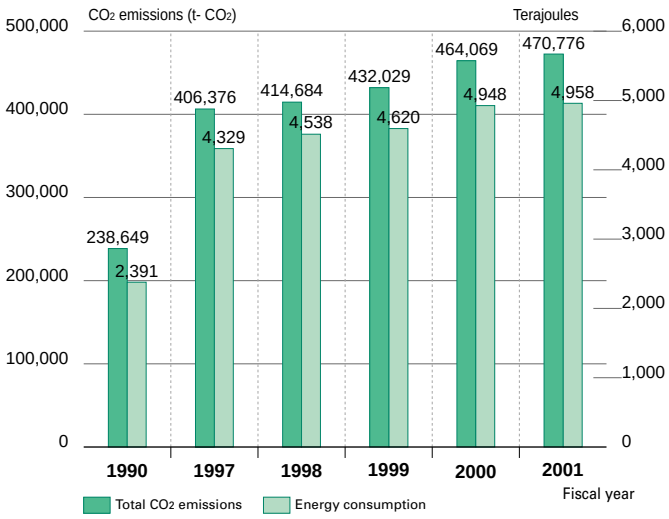


Figure 2

● CO_2 Emissions and Energy Consumption for All Production Sites and Offices in Japan



● Figures published by the Federation of Electric Power Companies of Japan were used for the CO_2 emission coefficient.
● These figures cover all Sharp production sites and office buildings of Sharp Corporation.

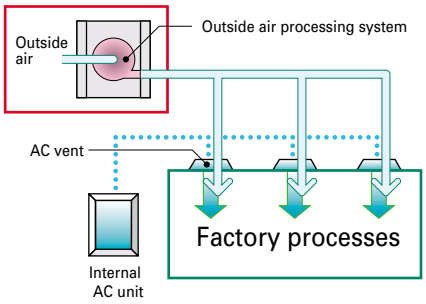
② Examples of Energy-Saving Activities

Sharp's energy-saving activities encompass not only improvements in our energy supply side, but also the continual improvement and refinement of our production facilities. Two examples are shown as follows.

Reducing Energy Consumption by Air-Conditioning

At our Shinjo site, which produces solar cells, manufacturing equipment radiates significant amounts of heat, making air-conditioning necessary even in the winter. Our "Winter Outside-air Cooling System" mitigates the need for this by selectively letting outside air into the plant to cool it. This strategy alone reduces 350 tons of CO_2 emissions per year.

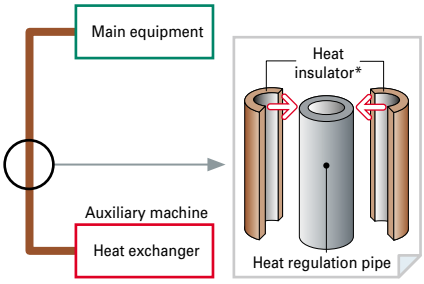
● Reducing AC energy consumption by introducing a Winter Outside-air Cooling System into factory processes



Reducing Energy Consumption by Manufacturing Equipment

By improving the insulating properties of the pipes connecting manufacturing equipment and the heat exchangers of our Fukuyama site, which produces semiconductors, we were able to cut in half the energy expenditures of the heat exchangers.

● Improving insulation on manufacturing equipment—auxiliary machine pipes



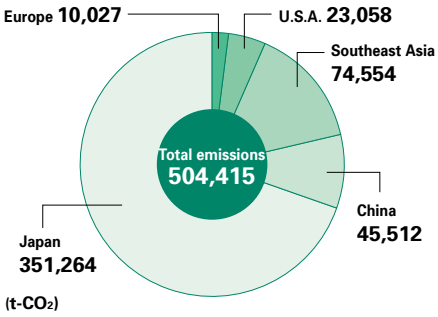
* Uses insulation subjected to gas separation analysis/evaluation with selected materials suited to clean room operating conditions.

③ Reducing CO_2 Emissions in Overseas Production Sites

Sharp's overseas production sites accounted for about 30% of the company's total CO_2 emissions in fiscal year 2001 at 153,151 tons*. Of these, the total emissions from sites in Southeast Asia make up about half of this amount.
By implementing the Green Factory Guidelines and introducing examples of energy-saving activities, we have succeeded in reducing our CO_2 emissions 2.1% per production unit compared to the previous year, especially in plants in Southeast Asia.

* CO_2 Conversion factors used by each country were utilized to calculate CO_2 emissions for sites in each overseas country.

● CO_2 emissions by area



④ Controlling Emissions of Other Gases

Greenhouse Gases (PFC, etc.)

Gases other than CO_2 are also responsible for the greenhouse effect. Among these greenhouse gases are HFC (hydrofluorocarbon), PFC (perfluorocarbon), and SF6 (sulfur hexafluoride), which are used mainly in processes for liquid crystals, semiconductor washing, and etching. Fiscal year 2001 emissions for these gases were 550,000 tons of CO_2, a 25% reduction from the previous year. New factories are now being planned, but we will be implementing the following measures to insure that emissions levels continue to fall:
(1) Reducing usage
(2) Switching to gases with lesser greenhouse effects
(3) Introduction of abatement system.

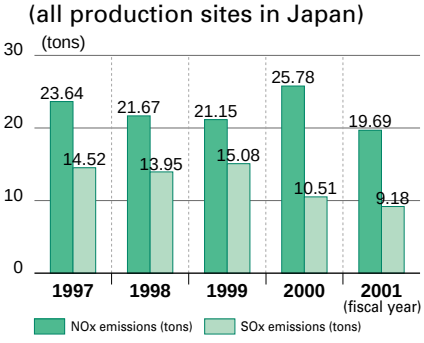
Ozone Layer-Destroying Substances

Since the coolants used in air-conditioners, HCFC (hydrochlorofluorocarbon), contribute to the destruction of the earth's ozone layer, we are in the process of switching to the use of HFC (hydrofluorocarbon), which does not deplete the ozone layer. However, since these substances contribute to the greenhouse effect, we are making efforts to switch to harmless substances.

NOx/SOx

By taking measures such as careful management of boiler operation and switching to fuels which contribute less to air pollution, we have succeeded in reducing NOx (nitroxide) and SOx (sulfoxide) emissions by 23.6% and 12.7% respectively from the previous year.

● NOx and SOx emissions (all production sites in Japan)



3 Minimizing Waste

Objectives/ Plan

◎ Japan: Achieve "zero discharge to landfill" by fiscal year 2002 in all production sites and reduce total amount of waste generated by 2% compared to the previous year.
◎ Overseas: Reduce the amount of waste generated per unit of production by 2% per year based on fiscal year 2000 levels and by 10% by the end of fiscal year 2005.

Promotional Measures/ Achievement

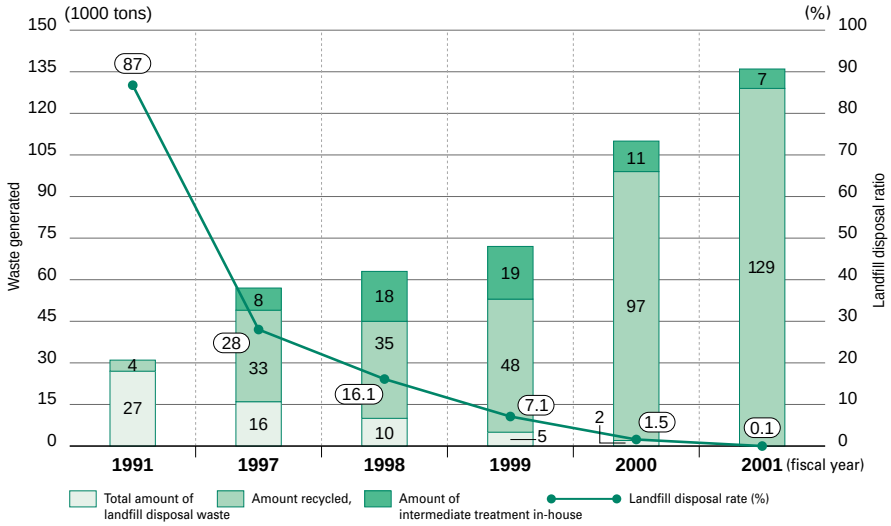
◎ Japan: "Zero discharge to landfill" was achieved in all production sites during fiscal year 2001. Total waste generated: 136,000 tons (124% compared to previous year). Amount of landfill disposal: 157 tons. Landfill disposal rate: 0.1%. Recycling rate: 94.8%.
◎ Overseas: 3% higher per unit of production compared to fiscal year 2000.

① Achievement of "Zero Discharge to Landfill"* in All Production Sites in Japan

Reaching "zero discharge to landfill" in all production sites in Japan, although originally a goal for fiscal year 2002, was achieved a year early in fiscal year 2001. Sharp also made great strides in recycling, reaching a landfill disposal rate of 0.1% and a recycling rate of 94.8%.
Achieving "zero discharge to landfill" was a result of efforts made by "waste reduction working activities" carried out independently at each site, thoroughly separating materials for processing, and originally developed intermediate in-house treatment techniques, the culmination of all of which was both the reduction of waste and the strengthening of recycling activities.
One of our greatest challenges was the reduction of waste water discharges.

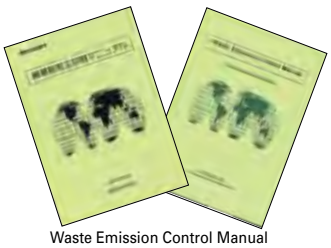
By establishing a system which utilizes microorganisms to enable water reuse, we succeeded in reducing yearly waste by 3,665 tons on a yearly basis. Further, we are actively engaged in developing new technologies and uses for our waste, such as the reuse of effluents and converting sludge into raw material for cement.
We are also continuing efforts to make advancements in areas such as converting waste LCD glass panels into raw material for tiles, converting waste photovoltaic panels into raw material for cement while recovering their metals, making fuel from waste plastics, and recycling waste paper into tissue paper.
Other than synthetic rubber scraps, which constitute the largest portion of our landfill disposal materials, various waste plastics are recycled for such purposes as organic compounds, thermal recycling, soil enrichment, filters, adhesives, and deodorizers.

● Amount of landfill disposal for waste for Sharp sites in Japan



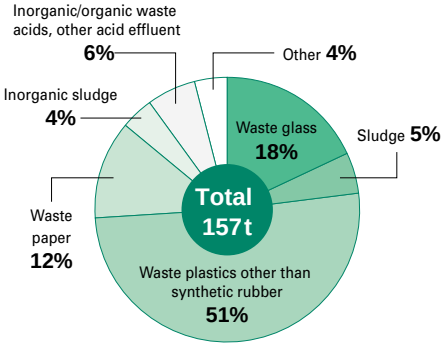
② Reducing the Total Amount of Waste Generated in Japan

Compared to the previous year, the total amount of waste generated increased by 2.9% at product production sites and by 24.6% at device production sites, combining for a total increase of 23.6% in Japan. These increases are accounted for by effluents from developing processes at our new plants.
We will continue to implement waste strategies based on Sharp's Waste Emission Control Manual. This will include maintaining the "zero discharge to landfill" status of our existing plants beyond fiscal year 2002 as well as introducing microorganism effluent cleansing and other technologies into new plants as they come on line to make them "zero discharge to landfill" as well.



Waste Emission Control Manual
(Japanese and English edition)

● Detailed analysis of landfill disposal waste for all production sites in Japan

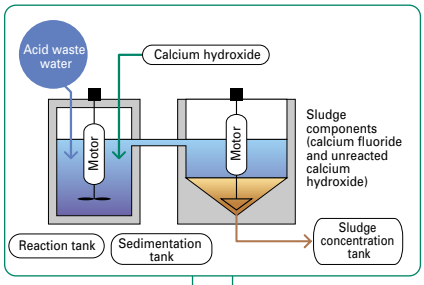


* "Zero discharge to landfill": Recycling and reusing both industrial and general waste from all sites to achieve landfill disposal of effectively zero. There are technological limitations in waste processing, but Sharp maintains the strictest standard in the industry, considering "zero discharge to landfill" to have been achieved only when landfill disposal ratios reach levels of less than 0.5% (landfill disposal ratio: amount of landfill disposal / amount of total emissions x 100) for 2 consecutive months.

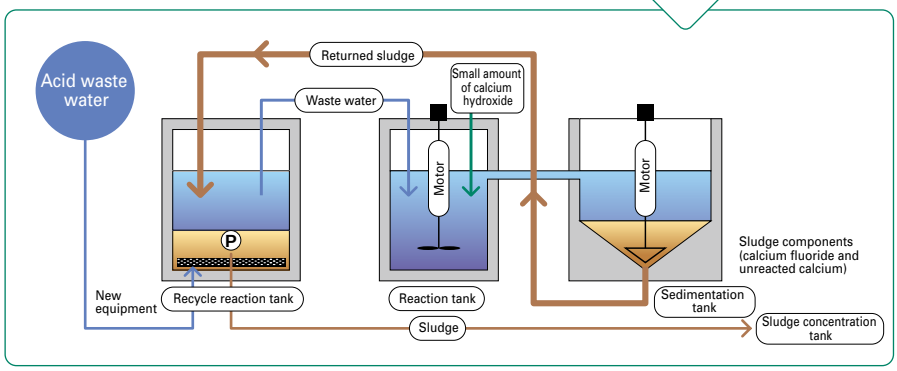
③ Examples of Waste Reduction (Reducing Sludge)

Sharp is making efforts to reduce sludge generation at all of its sites. In fiscal year 2001 7,179 tons of sludge were produced, of which 89%, or 6,389 tons, were recycled for use as raw materials in Japan. Sharp is also taking measures to reduce the amount of sludge produced at its production sites. One example of these activities is introduced here.
In order to reduce sludge produced from process effluent treatment facilities at our Fukuyama site, we developed an acid waste water treatment system using a new recycle tank. In this new system, the calcium hydroxide in the sludge in the sedimentation tank is fed into the recycle tank and reused, thereby reducing amounts of both calcium hydroxide and sludge produced.

● Old system's sludge recycling flow



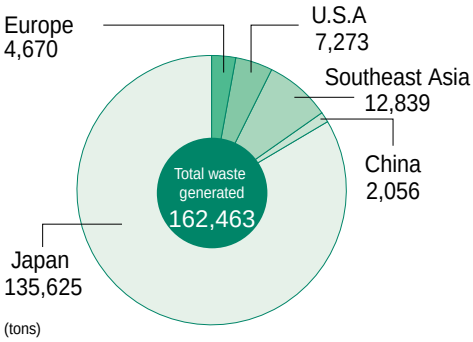
● New system's sludge recycling flow



④ Waste Reduction At Overseas Production Sites

The total amount of waste generated at overseas production sites in fiscal year 2001 was 27,000 tons, amounting to about 17% of the waste generated at all of Sharps' production Sites.
In fiscal year 2001, various strategies for waste reduction were implemented in each locale, such as the reuse of wooden packaging materials in the U.S.A.; however, factors such as a decrease in overseas production has led to a 3% increase in waste per production unit compared to fiscal year 2000.

● Total amount of waste generated by region

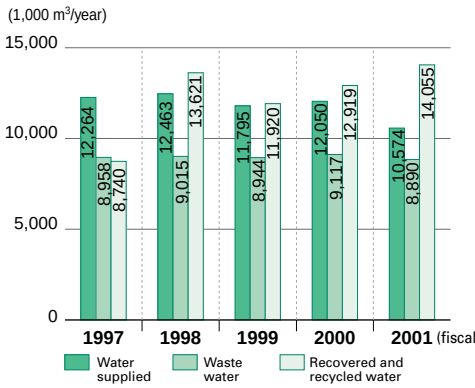


4 Using Water Effectively

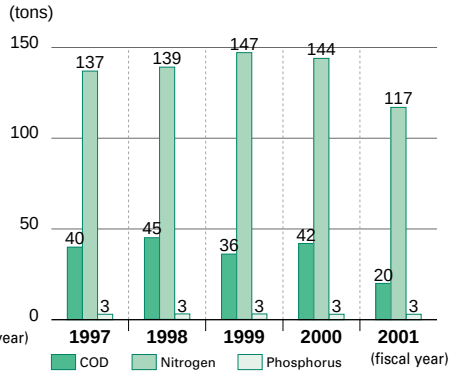
Sharp thoroughly cleans the water used in its plants before reusing it. In fiscal year 2001, the amount of recovered and recycled water increased 9% over the previous fiscal year, allowing us to reduce water supplied by 12% in Japan. Meanwhile, total waste water was reduced 2.5% from the previous fiscal year, allowing for similar reductions in COD and nitrogen emissions. Also, by constructing storage reservoirs to catch and hold rainwater, we are able to make effective use of this natural resource.

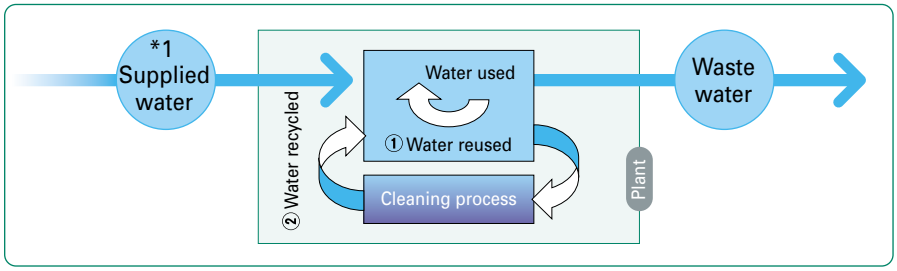
Strategies employed in our Fukuyama and Mie sites are introduced in-depth on pages 8 and 9.

● Amount of water supplied*1, waste water, and recovered and recycled water*2 for all production sites in Japan



● Amount of COD, nitrogen, and phosphorus emissions in Japan





*1 The types of water supplied to the facilities include municipal water, industrial water, and ground water, but not water recovered, recycled or reused within sites.
*2 Recovered and recycled water refers to water which is used for a process within a site and then used again within the same site without discharging it. The chart to the right shows total amounts for ① water reused and ② water recycled.

5 Management of Chemical Substances

Objectives/ Plan

◎ Japan: Reduce discharge of chemical substances that must be managed on a priority basis by 10% in fiscal year 2001 and by 50% by fiscal year 2003 compared to fiscal year 2000 levels.
◎ Overseas: Introduce the Global Chemical Substances Management System in overseas production sites.

Promotional Measures/ Achievement

◎ Japan: 53% reduction compared to fiscal year 2000.
◎ Overseas: Structure completed for the Global Chemical Substances Management System. Now implementing at individual production sites.

① Reducing Discharge of Chemical Substances That Must Be Managed on a Priority Basis

Sharp's stated goal was to reduce by fiscal year 2003 in Japan the discharge of chemical substances that must be managed on a priority basis* by 50% compared to fiscal year 2000. However, we have already succeeded in realizing a 53% reduction in 2001. Sharp will set new goals to achieve.

*Criteria for priority managed chemical substances

①Substances regulated by the Japan PRTR Law that are released or transferred in large amounts.
②Substances that risk causing annoyance to the general public living in the vicinity of a facility, even if the amount is small.
③Substances not covered under the Japan PRTR Law that are regulated under environmental laws, and that are released or transferred in large amounts.

● Program to reduce the amount of toxic chemicals discharged

Fiscal Year	2000	2001	2002	2003
Discharge goal	Reference year	10% reduction	30% reduction	50% reduction

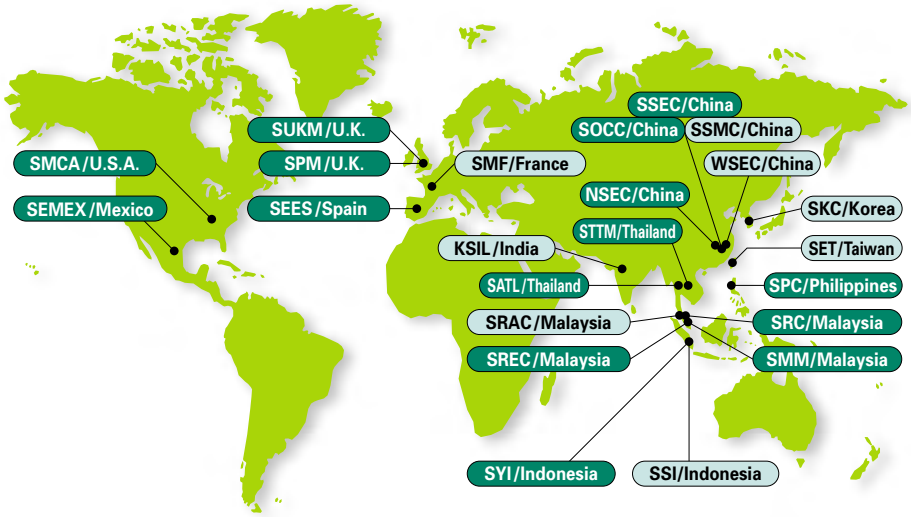
② Promoting Risk Communication

We are engaged in risk assessment worldwide. In Japan, we report and declare PRTR data based on the PRTR (Pollutant Release and Transfer Register) Law. In future years, Sharp will begin to disclose information regarding various risks involving chemical substances to consumers, businesses, and other citizens in areas surrounding our sites. Through such risk communication, we hope to build a relationship of mutual trust with our neighbors.

③ Chemical Substances Management System

In April, 2000, Sharp developed a proprietary chemical substances management system (S-CMS) in order to manage amounts of chemicals which are purchased, used and discharged. In October 2000, this system came online in Japan, and since then it has allowed us to comprehensively manage in the database all information regarding chemical usage throughout the company (about 5,360 substances) so that information can be analyzed on a site, organizational, or substance basis. Sharp applied its 2 years of domestic experience with this system in fiscal year 2001 to construct its Global Chemical Substances Management System. By linking this system with SAP (Enterprise Resource Planning System), the company has realized data collection that is both highly efficient and precise. This system will be implemented in worldwide production sites beginning in fiscal year 2002. This system will allow the company to integrate the management of all the chemical substances in use. Further, by actively promoting such chemical management ahead of international regulations, Sharp is able to achieve safety and hygiene risk reduction for dangerous chemical substances, as well as reduce burdens on the environment on a global scale.

● Production bases of introduction for the Global Chemical Substances Management System (S-CMS)



STEP 1 Bases of introduction for fiscal year 2002 (SAP-ready locations)
STEP 2 Bases of introduction for fiscal years 2003 and beyond (as allowed for by SAP or network infrastructure progress)

④ Results of PRTR Surveys for Fiscal Year 2001 in Japan

Of the 354 types of chemicals covered under the reporting requirements of the PRTR Law that were handled in quantities greater than 1,000kg/year during fiscal year 2001, Sharp facilities used 16 substances, totaling 2,820 tons. Of this amount, approximately 265 tons were released into the environment or transferred, accounting for 9.4% of the amount handled. Of the remaining amount, 72.9% were recycled as fuel, metal, etc.; 16.6% eliminated by reaction, chemical decomposition, etc.; and 1.1% were used in products.

⑤ Monitoring Surveys at Device Production Sites

Sharp was already conducting PRTR surveys of all of its sites in Japan. Additionally, along the boundaries of its device production sites (Mie, Nara, Shinjo, Tenri, Fukuyama), which handle a large amount of chemical substances, Sharp is voluntarily monitoring atmospheric concentrations of 30 toxic chemical substances selected from noxious air pollution sources and mobile emissions sources such as automobiles. This monitoring has been conducted regularly since fiscal year 1999, allowing the company to accumulate data and to understand our effect on the environment. In the future, we will be using the data produced by these monitoring surveys and the Chemical Substances Management System to perform risk assessment and risk management.

● PRTR totalization (16 substances)

(kg)

PRTR No.	Chemical	Handling quantity	Emission			Transportation		Consumption	Removal	Recycle
			To atmosphere	To public service water	Soil landfill	To sewage	Out of site			
16	2-Aminoethanol	2,347,089.70	2,223.06	0.00	0.00	0.00	136,447.24	0.00	207,276.06	2,001,143.34
30	Polymer of 4,4'-isopropylidenediphenol and 1-chloro-2, 3-epoxypropane (liquid): Bisphenol A type epoxy resin (liquid)	1,082.59	0.31	0.00	0.00	0.00	36.45	1,045.83	0.00	0.00
40	Ethylbenzene	2,255.17	577.10	0.00	0.00	0.00	726.41	0.00	951.66	0.00
63	Xylene	12,920.25	2,971.61	0.00	0.00	0.00	4,390.79	0.00	5,529.01	28.84
64	Silver and its water-soluble compounds	11,963.51	0.00	0.00	0.00	0.00	596.91	10,418.72	0.00	947.88
67	Cresol	1,100.04	0.02	0.00	0.00	0.00	1,100.02	0.00	0.00	0.00
85	Chlorodifluoromethane: HCFC-22	6,763.00	329.00	0.00	0.00	0.00	260.00	6,174.00	0.00	0.00
101	2-Ethoxyethyl acetate: Ethylene glycol monoethyl ether acetate	23,587.64	6,924.65	0.00	0.00	0.00	16,662.99	0.00	0.00	0.00
172	N, N-dimethylformamide: DMF	38,985.00	6.96	0.00	0.00	0.00	2,891.04	0.00	36,087.00	0.00
224	1, 3, 5-Trimethylbenzene	7,893.97	2,738.47	0.00	0.00	0.00	2,464.22	0.00	1,879.85	811.43
230	Lead and its compounds	13,638.25	0.00	0.00	0.00	0.00	560.26	13,077.99	0.00	0.00
252	Arsenic and its inorganic compounds	1,250.06	0.00	0.00	0.00	0.00	191.13	176.19	13.26	869.48
260	Pyrocatechol	5,444.13	0.00	0.00	0.00	0.00	5,344.13	0.00	100.00	0.00
266	Phenol	46,830.48	5,173.95	0.00	0.00	0.00	35,842.33	0.20	5,814.00	0.00
283	Hydrogen fluoride and its water-soluble salts	297,364.48	0.00	24,561.71	0.00	863.86	10,829.41	0.00	209,441.94	51,667.57
311	Manganese and its compounds	1,551.04	0.01	0.00	0.00	0.00	28.73	1,517.40	4.89	0.00
TOTAL		2,819,719.31	20,945.14	24,561.71	0.00	863.86	218,372.07	32,410.33	467,097.67	2,055,468.53

⑥ Reducing Soil and Ground Water Discharge

Since 1998, Sharp has been conducting soil and ground water surveys on 11 of its sites in Japan. Where pollution was identified (Nara, Yao, Tenri, Shinjo), information was made public through the local authorities. Since chlorine solvents were the source of the ground water pollution, we stopped using them entirely at the end of September 1999. In the future, Sharp will utilize its Chemical Substances Management System to methodically identify our purchasing and use of chemical substances and to reduce emissions into the environment.

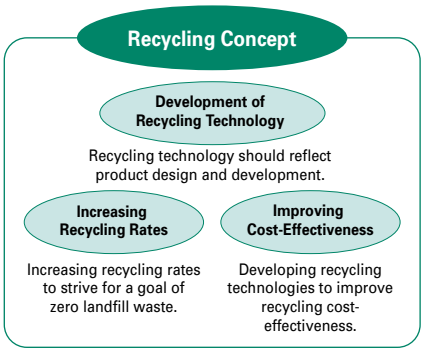
● Report on Status of Measures to Clean Soil and Ground Water

Site	Clean-Up Status for Fiscal Year 2001
Nara Site	• From October 1999, we have installed waterproof walls along the boundaries of the site to stop pollution diffusion, as well as installed cleaning equipment and pumping wells to initiate clean-up. • Clean-up is progressing smoothly along the site boundaries. • We are conducting on-site inspections of the clean-up process on a yearly basis for local residents and governmental staff.
Yao Site	• From September 1999, we have installed cleaning equipment and pumping wells to initiate clean-up. • Because the area with the highest concentration of pollution was the Yao City urban planning site, clean-up work here was completed by February 2002. • We are conducting on-site inspections of the clean-up process on a yearly basis for governmental staff.
Tenri and Shinjo Sites	• Since pollution at these two sites was minor, we are conducting ground water monitoring on a regular basis and informing local authorities of the results.

Activities Aimed at Achieving a Recycling-Oriented Society

1 Recycling Policies Action Programs

In order to encourage effective use of resources and to reduce waste, the Home Appliances Recycling Law was enforced in April 2001 in Japan. This law mandated that appliance manufacturers take back and recycle four types of home appliances: air conditioners, TVs, refrigerators, and washing machines.
Sharp is conducting recycling processing in accordance with this law. Further, in order to contribute even more to a recycling-oriented society, we are taking steps to strengthen our system for recycling and reusing end-of-life products other than home appliances, including information devices such as computers, and office equipment such as copiers.



2 Recycling Home Appliances

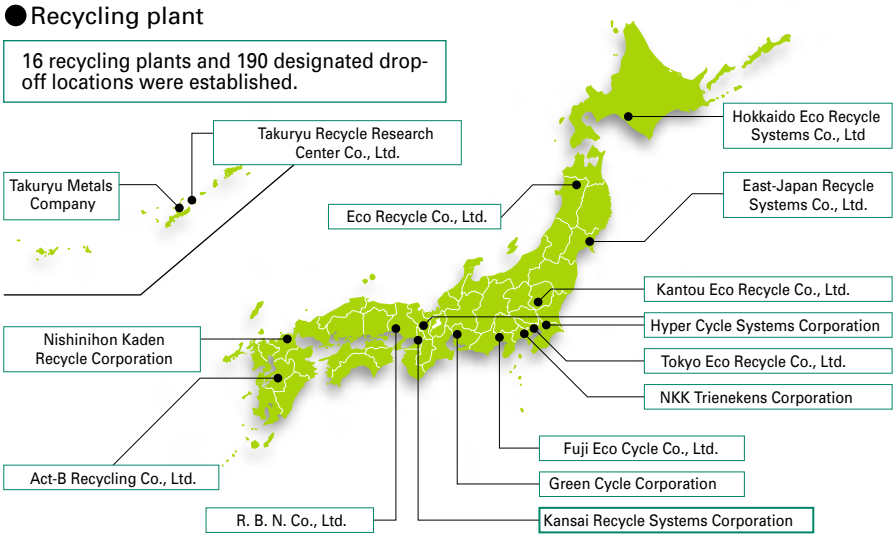
Objectives/ Plan	◎Taking back and recycling four categories of home appliances in Japan. ◎Realization of material recycling of polypropylene.
Promotional Measures/ Achievement	◎ Achievement of recycling rates for all four categories of home appliances exceeding the legally required recycling rates. ◎ Realization of material recycling for polypropylene used in washing machine (ES-U80C, U70C) tubs.* * See p. 23 for details.

1 Recycling System for Four Home Appliance Categories in Japan

Sharp has cooperated with Sanyo Electric Co., Ltd., Sony Corporation, Hitachi H.L.S Ltd., Fujitsu General Limited, and Mitsubishi Electric Corporation to construct a highly efficient recycling system for the four categories of home appliances. This system consists of 190 designated convenient drop-off locations and 16 recycling plants, all located strategically throughout the country. The recycling plant for the Kinki region, Kansai Recycle Systems Corporation was established jointly by Sharp Corporation, Mitsubishi Materials Corporation, and five other electronics companies.

● Recycling plant

16 recycling plants and 190 designated drop-off locations were established.



● Recycling fees

Air conditioner	TV	Refrigerator	Washing machine
3,500 yen	2,700 yen	4,600 yen	2,400 yen

Notes:
Recycling fees are the total costs required to process recycling in the recycling plants, establish and manage the drop-off locations, and transport items from the drop-off locations.
Recycling fees are received from the customer when they have purchased a new appliance that falls under the Home Appliance Recycling Act. Sharp establishes prices based on a "1 price per item, nationwide unified fees" policy. Prices given on the left do not include pickup and transportation fees from outlets and local authorities.

② Sharp Recycling Achievement in Fiscal Year 2001

(for period from April 1, 2001 – March 31, 2002)

As shown in the tables to the right, the recycling rates for the four types of home appliances covered by the Home Appliance Recycling Law (air conditioners, televisions, refrigerators, washing machines) processed at 16 recycling plants exceed the legally required recycling rates.

● 1) Recycling Status of Specified Kinds of Home Appliances (Sharp products)

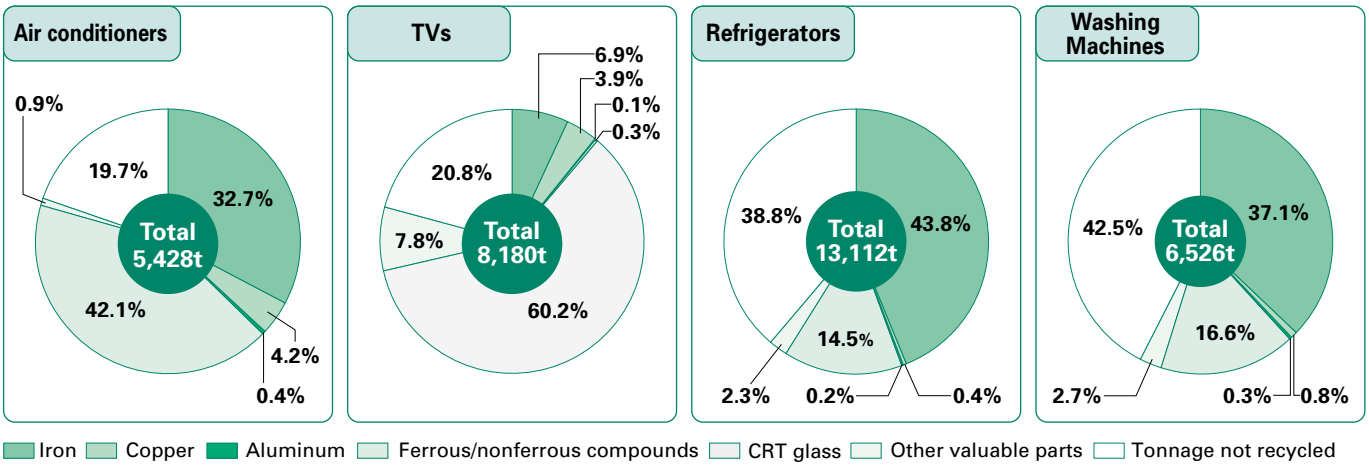
Category	Unit	ACs	TVs	Refrigerators	Washing Machines
Processed units	Unit	126,874	320,319	223,041	234,320
Processed tonnage	t	5,428	8,180	13,112	6,526
Recycled tonnage	t	4,359	6,480	8,030	3,754
Recycling rate	%	80.3	79.2	61.2	57.5
Legally required recycling rates	%	60	55	50	50

*Note: "Processed units" and "processed tonnage" refer to the total number of units and tonnage of appliances in categories specified by law which underwent processes necessary for recycling in fiscal year 2001.

● 2) Tonnage of Recycled Materials (Sharp products)

Category	Unit	ACs	TVs	Refrigerators	Washing Machines
Iron	t	1,778	565	5,745	2,419
Copper	t	227	317	57	54
Aluminum	t	20	6	20	17
Ferrous/nonferrous compounds	t	2,285	28	1,903	1,084
CRT glass	t	—	4,923	—	—
Other valuable parts	t	49	641	305	180
Total (tonnage recycled)	t	4,359	6,480	8,030	3,754

● 3) Details of recycled and other process tonnage (Sharp products)



Regarding Release of CFC in Kansai Recycle Systems Corporation

During the processing of air conditioning units during the period of July–September 2001, improper procedures were followed at Kansai Recycle Systems Corporation, which led the release of CFC into the atmosphere. This release was in violation of Japanese law, Sharp's policy, and our recycling procedures. It was also revealed that the plant exceeded the number of hours of operation allowed under the Waste Disposal Law.

Therefore, on March 20, 2002, Sharp and the other electronics companies who had contracted their recycling operations to Kansai Recycle Systems Corporation were issued a warning from the Ministry of Economy, Trade and Industry and the Ministry of the Environment regarding the Home Appliances Recycling Act. Next, on May 2, 2002, Kansai Recycle Systems Corporation received orders from the Osaka government to cease operations for 90 days and to make improvements in their operations. At the same time an order was also given to the company by Hirakata City to improve their handling of CFC.

After management discovered the problem, Kansai Recycle Systems Corporation voluntarily ceased operations and devised countermeasures to prevent these breaches from reoccurring.

The primary countermeasure to prevent reoccurrence was the establishment of a "Legal Respect Committee" whose duty is to enact programs fostering respect for the law.

Other countermeasures included restructuring the information system that tracks waste items from receiving to shipping, providing procedural manuals to the employees, and strengthening of the recovered CFC coolant management system to prevent filled CFC cylinders from being opened by using both seals and lids. We also implemented a system of information disclosure to local residence and governing bodies.

The plant made preparations for reopening in August, having received instruction and implemented thorough measures to prevent reoccurrence. During the period of the plant's closure, other recycling plants performed appropriate recycling in its stead.

(Refer to p. 15 for details on Sharp's response.)

3 Recycling Information Equipment

Objectives/ Plan	◎ Build a recycling system for business-use PCs in Japan. ◎ Collect copiers and reuse parts in Japan.
Promotional Measures/ Achievement	◎ Sharp was designated a general recycled industrial waste processor in preparation for full operation of its business-use PC recycling system in fiscal year 2002. ◎ 10,472 copiers were collected.

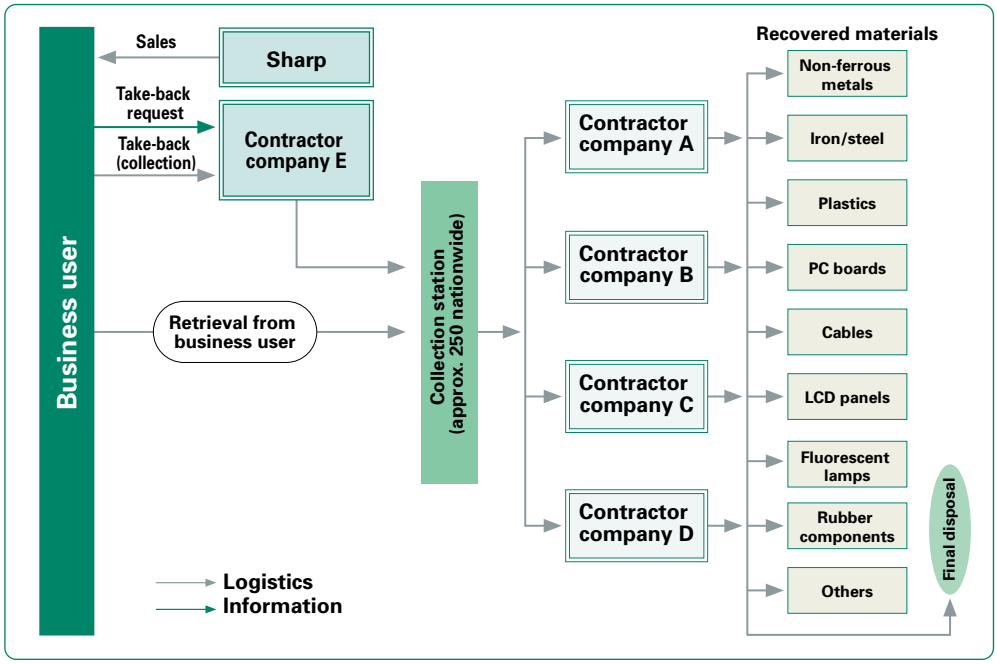
① Collecting and Recycling PCs in Japan

Sharp has constructed a proprietary recycling system consisting of 250 collection stations and 4 recycling facilities in its efforts to develop an efficient process for the recycling of business-use PCs.
In April 2002, Sharp was designated a general recycled industrial waste processor according to the Law of Promotion of Effective Utilization of Resources in Japan, allowing the company to operate its system fully starting in fiscal year 2002.

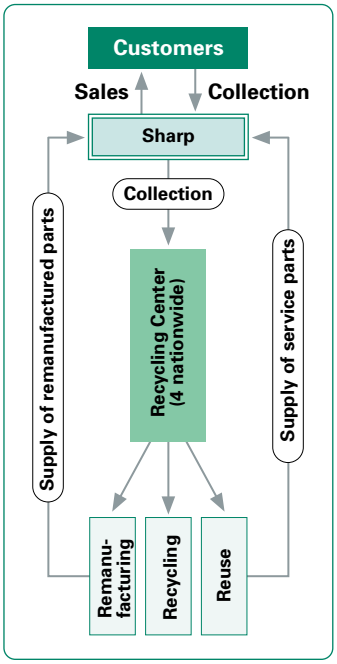
② Promoting Remanufacturing, Recycling, and Reuse of Copiers

In fiscal year 2001, Sharp's "Nationwide Collection and Processing System," which became operational in the previous year swung into full gear in Japan. It collected 10,472 units (a 338% increase compared to the previous year) and processed them for remanufacturing and recycling.
The system using parts from collected copiers for repair became operational in Japan beginning in fiscal year 2001.
Assorted types of circuit boards and fusing units are reused.
Improvement of Sharp's overseas service department's use of reused parts is a topic for future consideration.
In order to realize even more effective use of resources, we will be enacting strategies to expand our collection, recycling, and reuse of parts worldwide in the future.

● PC recycling flow in Japan



● Copier collection and recycling flow in Japan

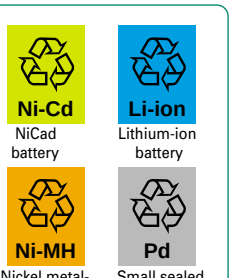


4 Recycling Portable Rechargeable Batteries

Sharp is also pursuing the recycling of the secondary (rechargeable) batteries that are found in many of its products. By joining the "Portable Rechargeable Battery Recycling Promotion Center," Sharp is cooperating with other members of the industry in collecting and recycling both conventional NiCad and other secondary batteries in Japan. Sharp is already participating in the RBRC Recycling program in North America.

Portable Rechargeable batteries

Portable Rechargeable battery collection box

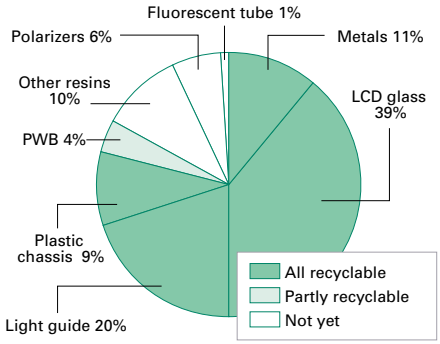


Portable Rechargeable battery recycling symbol

◎Recycling LCD Modules

Sharp takes its responsibility as the leading LCD manufacturer seriously, and thus has also taken the lead in the field of LCD recycling. Beginning, in fiscal year 2001 in Japan, Sharp undertook the development of technology for recycling the plastic chassis and PC boards of LCD modules.
Plastic chassis may be reused for items such as post-fusion transport palettes and stakes. Precious metals can be recovered from PC boards. Glass fiber is turned into slag and reused as a material in the production of cement. These processes allow about 80% of the original weight of the LCD module to be recovered and recycled.

● Currently achievable recycling rates and fiscal year 2001 targets



● LCD module composition (Sharp 13.3-inch model)

Major components	Key materials
Metals	Stainless steel, aluminum, plated copper sheet
LCD glass	Glass, organic materials, others
Light guide	Acrylic resin
Plastic chassis	PC + ABS (includes glass fibers)
PC board	Precious metals (gold, silver), resins, glass fibers
Other resins	Resins (composite materials)
Polarizers	Organic materials (composite materials)
Fluorescent tube	Mercury, others

● Examples of LCD glass recycling

In one of our LCD display factories in Mie, we worked with the INAX Corporation for the development of technology to recycle waste LCD glass into material used for tiles.
We began converting waste LCD glass into material for tiles in October 2000, and in fiscal year 2001 approximately 310 tons were recycled. We plan to continue these recycling operations at a rate of about 30–50 tons per month.

● Recycling Waste LCD Glass into Tile Material

1. Waste LCD glass
Waste LCD glass is crushed to below 2.5 mm

Pulverizing

2. Pulverized product
Pulverized product is mixed with clay and feldspar (*1) to make material for tiles, then wet ball-milled (*2).

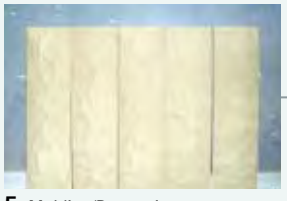
Material mixing
Wet milling

3. Slurry
After the liquid and solid particles are mixed in a suspension, it is dried with a spray drier (*3).

Drying

4. Raw material powder
Raw material powder is created.

Molding
Decorating



5. Molding/Decorating
The material is molded and the surface decorated, then fired in a kiln at about 1,250˚C.

Firing

6. Finished product
The finished product (tile).

(*1) Feldspar: A silicate containing sodium, calcium, potassium, and other elements. This rock-forming mineral is found in many rocks.
(*2) Ball-milling: A milling apparatus widely used to mill mineral ores.
(*3) Spray dryer: A drying apparatus used to spray and dry the slurry.

Environmentally Conscious Distribution

1 Environmental Activities at Distribution Sites

Objectives/ Plan

◎Fiscal year 2001, shift to railway containers in Japan, goal: 182 containers*/month (110% compared to previous year)
* 5-ton shipping container

Promotional Measures/ Achievement

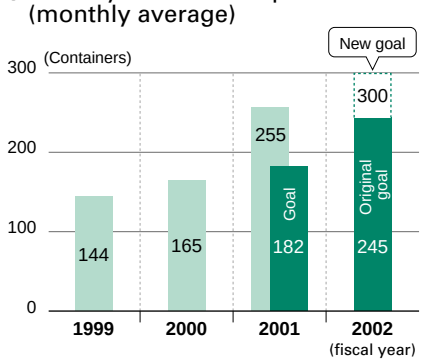
◎Fiscal year 2001 achievement: 255 containers/month (140.1% of goal, 154.5% compared to previous year)
* The goal for fiscal year 2002 was achieved ahead of schedule.

① Changing Modes of Transport

Sharp is currently pursuing a shift away from conventional truck freight to the more efficient railway container shipping, especially on its long-distance transportation routes.
Since the goal for this shift in transportation method for fiscal year 2002 was achieved in 2001, we have set a new goal for fiscal year 2002.
At the East Japan Logistics Center of the Domestic Sales and Marketing Group Distribution Center, our proactive approach to this shift in transportation modes earned Sharp a First Place Award at the "Second Railway Freight Promotion Awards" sponsored by the Japan Rail Freight Research Center, Limited.

Second Railway Freight Promotion Awards

● Railway container shipments (monthly average)



② Eliminating Engine Idling

We have almost entirely eliminated engine idling by using stickers placed in vehicles, as well as signs and posters, to encourage drivers to turn off their engines while waiting to load or unload. As a result, we are reducing CO_2 emissions by the equivalent of 66 tons and saving 23 kl of fuel per month. This amount of fuel is enough to power a single truck a distance of 90,000 km, twice around the Earth.

A "No engine idling" sticker

③ Reducing Buffer and Packaging Materials Waste

Concentrating mostly on import/export containers, Sharp has switched to use of reusable airbags for its buffer materials, and has succeed in reducing use of cardboard by 15 tons/month and expanded polystyrene by 144 m^3/month in Japan.
We are also making efforts to reduce waste by reusing packaging materials used for shipping small products and by repairing wooden palettes instead of disposing of them.

④ Introducing Low-Pollution Vehicles

Our goal is a 100% switchover rate to electric forklifts in our distribution centers in Japan by fiscal year 2003. Electric forklifts result in lower emissions of CO_2 than gasoline forklifts and they can be powered at a nighttime discount charge. In fiscal year 2001 we switched 7 forklift units to electric power, resulting in a reduction of CO_2 emissions by 21.2 tons. At present, the switchover is 98% complete.


Electric forklift

⑤ Efforts for Reducing Total Transport

At present Sharp is undertaking efforts to identify the total amount of transport involved in shipping our products, and is publicly disclosing this information. Our total transport level for fiscal year 2001 was 149 million ton kilometers (t x km) in Japan. In order to alleviate the burden of our transport on the environment, we are working to improve our distribution efficiency by 1) improving loading efficiency and 2) increasing the amount of direct-from-factory shipping.

2 Efforts for Containers and Packaging Materials

Objectives/ Plan

◎ Cease use of expanded polystyrene for products weighing less than 5 kg.
◎ Cease use of expanded polystyrene for products weighing less than 10 kg by March 2003.
◎ Reduce use of expanded polystyrene for products weighing 10 kg or more.

Promotional Measures/ Achievement

◎ Total elimination of expanded polystyrene use for products weighing less than 5 kg*
◎ Succeeded in eliminating expanded polystyrene use for some products weighing 10 kg or more, including large LCD TVs.
* Except for some continuing products produced

① Efforts to Reduce the Use of Polystyrene Foam

After succeeding in the total elimination of expanded polystyrene as a packaging material for all of our products under 5 kg in fiscal year 2000, we set a goal of eliminating it as well from products under 10 kg, which can usually be carried home from the store by customers, by March 2003.

Full cardboard packaging for AC indoor unit

In Japan, Sharp's usage rate for cardboard is approximately 89%. Since the recycling rate for this commonly used packaging material is 93%, this means that approximately 83% of the packaging material used for Sharp products is eventually recycled.
We do continue to use expanded polystyrene packaging for seasonal items such as fans which are packed away even after purchase, but in the future we will take into account the judgment of the LCA and develop a packaging material which places less of a burden on the environment.

② Switching to Long-Lasting Packaging Materials for Inter-Factory Transport

By switching to plastic trays for the inter-factory transport of LCD units instead of the fully cardboard packaging we have been using, we succeed in 1) reducing the amount of waste produced, 2) enabling long-term use of trays, and 3) reducing costs. Finally, trays which are no longer used are designed so that they can be stacked and collected, even further increasing the energy efficiency of transportation.

Reusable packaging for LCD units

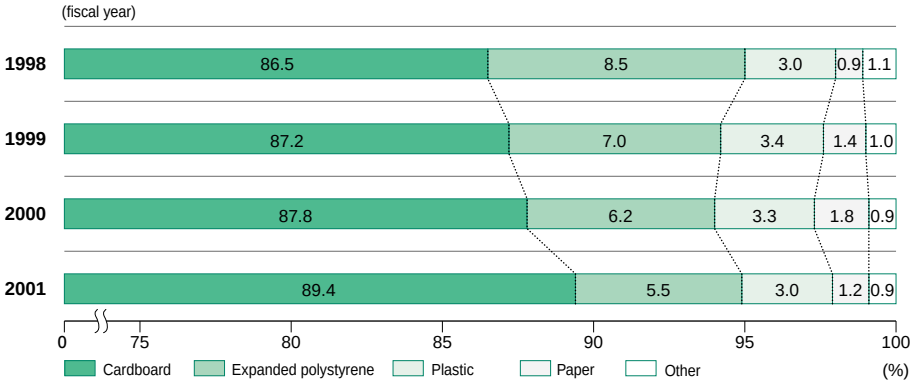
③ Packaging Materials to Be Displayed on All New Products in Japan

As of April 2001, the Japanese Law for Promotion of Effective Utilization of Resources requires labeling of packaging material used for products*. Thus Sharp is labeling the packaging materials for all of its new products as of April 2001, while drafting and implementing company-wide guidelines for this purpose in Japan.

* Probationary period is until March 2003.

Example of a container and packaging label

● Use of different packaging materials (for sales in Japan)



Increasing Environmental Awareness

1 Environmental Education Programs

Objectives/ Plan

◎ Build up environmental friendly corporate culture by promoting environmental education programs for all employees, from new employees to top management.

Promotional Measures/ Achievement

◎ General Training: 319 participants
◎ Expert Training: 292 participants
("Green Factory Course" added to the "Green Engineer Seminar".)

1 Educational Policies

At Sharp, we consider the mind-set of each employee who performs environmental activities to be of the utmost importance, which is the reason for our environmental education.
In Japan, in order to cultivate an environmentally friendly corporate culture, we provide two levels of environmental education, a "General Training" course which seeks to increase environmental awareness and knowledge for all our employees, and an "Expert Training" course, which is meant to produce environmental specialists in various fields of expertise.


"Green Engineer Seminar"

2 General Training

Employees receive "General Training" both when they enter the company and when they are promoted to managers. There are also training courses for experienced managers on environmental issues to ensure they have a thorough understanding of Sharp's environmental policies. Although our target for the number of participants in fiscal year 2001 was 750, only 319 participated. For fiscal year 2002, we have revised the content of the training for experienced managers on environment issues, and are now conducting an environmental compliance seminar centered on issues of following legal compliance. Full-scale training began in May, and as of the beginning of July the number of participants had climbed to 1,509.

3 Expert Training

Sharp also employs "Expert Training" courses to ensure that personnel in engineering, planning, factory management, and other areas have the specialized information they need related to the environment and to give them appropriate training. In March, 2002, in addition to the "Green Product Basic Course," which was already in place, we added a "Green Factory" course for equipment, process management, and production engineers in the "Green Engineer Training" courses designed for planning and engineers in our product groups. These courses take examples both from outside the company and from various sites within the company to impart specialized knowledge regarding topics such as energy conservation, resource conservation, and management of chemical substances.
In the future, we plan on expanding courses on topics such as design for recycling as part of our plan to methodically educate environmental experts at each of our sites.

● Training content and number of participants in Japan

*Fiscal year

Level	Type	Summary	2000*	2001*
General Training	For new employees	Understanding how to approach environmental issues and raising environmental awareness.	254	272
	For new managers	Understanding the latest trends in environmental problems and gaining a thorough understanding of Sharp's environmental strategies	24	24
	For experienced managers	Held in each Sharp site in Japan, this is a general course about environmental matters and how Sharp approaches them	1,372	23**
	Subtotal		1,650	319
Expert Training	For employees assigned to foreign offices	Training for employees assigned abroad, presenting information about environment laws and regulations in the destination country.	27	37
	Tour of Kansai Recycle Systems Corporation	A tour is given of the Kansai Recycle Systems plant in order to give employees a first-hand glimpse of recycling and to present them a forum for thinking about environmental issues.	—	79
	"Green Engineering Training" "Green Product Basic Course"	Thoroughly informing product headquarters engineers about the "Green Product Guidelines," environmental laws and regulations, and the latest environmental technologies.	84	48
	"Green Engineering Training" "Green Factory Course"	Thoroughly educating equipment, process management, and production engineers from each site about environmental knowledge necessary for factory management, including energy conservation, resource conservation, and chemical substances management.	—	18
	For sales and service	Employees of sales and service companies receive training on compliance with the Home Appliance Recycling Law and other laws and regulations necessary for conducting business.	1,328	—
	"Internal Auditor Training"	Education of internal auditors.	84	94
	"Internal Lead Auditor	Education of internal lead auditors.	20	16
	Subtotal		1,543	292

** Contents in training for experienced managers on environment issues has been revised. This course is scheduled to be fully staged from fiscal year 2002.

● "Green Engineer Training," "Green Factory Course" curriculum

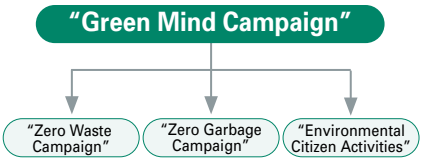
Item	Details
Summary of environmental problems and Sharp's approach	Global warming, resource recycling society, and the "Green Factory" concept.
Sharp's energy conservation measures	The Kyoto Protocol, the Law Concerning the Rational Use of Energy, and the status of each site.
Sharp's waste measures	Waste processing methods, Sharp's waste measures, and examples from other companies.
Sharp's overseas strategies	Status of overseas sites and examples from other companies.
Sharp's chemical substance management	Necessity for chemical substances management and the Chemical Substances Management System.
Keys to success in energy conservation	An outside instructor will give examples of successes from other companies.
Environmental efforts at the Fukuyama site	"Green Factory" example from the Fukuyama site.

2 Green Mind Campaign

Objectives/ Plan	◎ Aim to improve environmental protection awareness and contribute to the community while implementing environmental activities. ◎ Enact environmental citizen activities at all sites both in Japan and internationally.
Promotional Measures/ Achievement	◎ In addition to previous activities, environmental citizen activities were enacted at all sites in Japan during the Environmental Month of June. ◎ In addition to environmental poster and slogan contests, we enlarged the scope of our efforts to promote environmental awareness by having a contest for the cover of our 2002 Environmental Report and other activities.

① Sharp's Promotion to Unify Employees and Management with its "Green Mind

In order to contribute to local communities and encourage environmental protection awareness in our employees, Sharp has enacted the "Zero Waste Campaign," "Zero Garbage Campaign," and "Environmental Citizen Activities" at all of its sites in Japan. These activities are not limited to the month of June, but are performed consistently every month.



② Contributing to the Local Community

Sharp has engaged in local clean-up activities once every month ever since it began its campaign in 1998. These activities contribute to the local community while at the same time improving employee environmental protection awareness and ethics.

Clean-up activities on a road near one of our sites

③ "Green Mind Contests"

In order to encourage a "Green Mind," Sharp holds a "Green Mind Contest" during the Environmental Month of June. We invite company employees and their families to submit works concerning the environment in one of four categories: "Eco-life essays," "Environmental slogans," "Photographs," or "Paintings." Contest winning works were displayed at a company environmental exhibit. This year we held a contest for the design of the cover of the 2002 Environmental Report, for which 156 entries (23 from Japan and 133 from overseas) were submitted.

Winning submission for the Environmental Report on display at the environmental exhibit.

④ Cultivation of the Kenaf Symbol Plant

The kenaf plant's high rate of photosynthesis, its ability to absorb large amounts of CO_2 emissions and the way it purifies water make it a very environmentally useful plant. Sharp is cultivating the kenaf plant at all of its sites in Japan as a symbol in its environmental campaign. About 1,700 kenaf plants were harvested and used in cooperation with the labor union for business cards and other paper products.
Many employees participate in the planting of kenaf that takes place in May.

Kenaf plants grow to 4 to 5 meters within a year, and in the fall pale yellow flowers reminiscent of hibiscus flowers.

Being a Forestation Volunteer in Thailand

Hideyuki and Yuuki Tsuji (father and son)
Hirano Sub-Division, West Japan Division,
Sharp Labor Union

The Japanese Electrical, Electronic and Information Unions' "Children's Forest Plan" seeks to increase the amount of green on the earth through overseas forestation volunteers.
I wanted to use this valuable experience to teach my eldest son (9 years old at the time) to protect the environment and, hopefully, something more as well. The process of planting the trees itself was simple, but since it was the rainy season at the time, we were drenched in both rain and sweat every day. My son learned to stop being embarrassed, and learned the courage to face his challenges directly. Through working on tree planting, both my son and the Thai children learned the both necessity of forestation and the importance of our forests. I pray that we can entrust the protection of our forests to them.

3 Disclosure and Communications

Objectives/ Plan

◎ Two-way communications with society by actively disclosing information.
◎ Issuing environmental reports

Promotional Measures/ Achievement

◎ Constantly publishing the latest information by means of the Environmental Report (in Japanese and English), presentations to environmental exhibits, and a constantly updated environmental website.

① Information Disclosure

Sharp has published its Environmental Report every year since 1999.
Also, our Environmental Pamphlet, which is a compact and easy-to-understand version of the report, is available at exhibits and is otherwise widely distributed.

2001 Environmental Report

② Latest Information Over the Web

Sharp has a portion of its website devoted to environment issues so that it can always present the latest information about its environmental activities. The Environmental Report as well as environmental data from various sites is available on this site. Internet viewers can also view information about products which apply under the Law on Promoting Green Purchasing and other environmentally conscious products on the site.

③ Communication with Customers about the Environment

Sharp makes every effort to respond to questions and surveys from either individuals or organizations regarding the environment.
In order to facilitate this communication with customers about the environment, Sharp has established lines of communication encompassing the Internet (e-mail), faxes, and letters. Opinions and questions received from customers are forwarded to the appropriate department, where they are answered as quickly as possible.

● Details of questions and surveys asked Sharp by individuals and organizations (April, 2001 – March, 2002)

(1) Queries received from website (e-mail): 39*
(2) Queries received by fax or letter: 44*

Topic	No.	Topic	No.
Recycle	16	Chemical substances management	1
Green purchasing	7	Product-related	7
Environmental accounting	7	Waste reduction	2
CO_2 reduction	6	Environmental management	7
Environmental education	7	General environment	12
Information disclosure	4	Other	13

* Not including requests for the materials such as Environmental Report

④ Environmental Exhibition

At the Eco Products 2001 exhibition held at Tokyo Big Sight in December, 2001, we demonstrated Sharp's stance on the environment with an exhibit built around the theme of "Towards the environmental century, let's begin the 21st century life of energy creation and conservation." The exhibit highlighted Sharp's dedication to environmental preservation through new ideas and products such as "Energy-creating photovoltaic cells," "Energy-saving LCDs," and "Environment and Health Green Goods." Also, each of our sites participates in local exhibitions and events in order to deepen our communication with people of various localities. In fiscal year 2001, Sharp's Mie and Tenri sites participated in local environmental exhibitions.

Explaining photovoltaic cells so that even children can understand

Introducing a system for reusing waste water (recipient of the 3rd Japan River Award)

4 Local Activities Worldwide

Objectives/ Plan	◎ Conduct "Green Mind" activities and other actions to improve the community at all Sharp locations worldwide.
Promotional Measures/ Achievement	◎ Held regional environmental conferences in China (April), ASEAN (September), and North America (October). ◎ Implemented special Sharp "Green Mind" activities in all Sharp locations worldwide.

① Activities at Production Factories

At Sharp-Roxy Appliances Corporation (M) Sdn. Bhd. (SRAC) in Malaysia in July, 2001, a "Paper Recycling Campaign" for the plant was implemented. As a result of asking workers to reuse paper, the amount of paper sent to recyclers for processing decreased by 15%.

Instructors showing how to reuse paper. (SRAC in Malaysia)

At Sharp Manufacturing Company of U.K. (SUKM), the environmental management manual and other documents have been digitized, contributing to a paperless work environment. Further information such as amounts of waste and energy consumed by division are posted on the company's intranet, helping to increase interest in environmental activities.
At Wuxi Sharp Electronic Components Co., Ltd. (WSEC) in China, an environmental management system was constructed in 1999. In 2000 the company received ISO 14001 certification and expanded its range of activities from an LCD factory to a tuner factory as well. These activities were so well received by the local government and by the Wuxi Environmental Committee that the company received a "Green Factory" commendation in October 2001. Through a daily environmental education program at Sharp Appliances (Thailand) Limited (SATL), the company has succeeded in reducing its facilities and machinery operation times by taking actions such as turning off the factory lights during the lunchtime break. Such steps have resulted in monthly energy savings of 115,459 kWh. Also, by promoting the separation of waste into more than 10 categories and reuse, the company has succeeded in reducing the amount of waste processed in fiscal year 2001 by 30% (compared to 1999).

② Contributing to the Local Community

For Environment Day in Malaysia on March 29, 2002, Sharp Manufacturing Corporation (M) Sdn. Bhd. (SMM) volunteered at a home for the elderly and helped beautify the environment through planting trees. They also donated a video deck to commemorate the event.

Planting trees in the outdoor café of the home for the elderly in the Batu Pahat district. (SMM in Malaysia)

In the Philippines, Sharp (Phils.) Corporation (SPC) donated used wooden palettes to Rizal, a rural village. These pallets are reused as material for daily necessities such as building fences around villagers' homes. Also, materials such as empty containers and plastic bags were also donated to the local residents for reuse as garbage bags or water collection tanks.
In Spain, Sharp Electronica España S.A. (SEES) held an environmental poster contest for its employees and their families in December, 2001 as part of their environmental education program. A portion of the costs for installing photovoltaic cells was also donated to a local junior-high school.

A poster submitted by an employee's family for the environment poster contest. (SEES in Spain)

A portion of the costs for installing photovoltaic cells was donated to local Sant Cugat junior-high school. (SEES in Spain)

In Taiwan, Sharp Electronics (Taiwan) Co., Ltd. (SET) took part in beach clean-up activities on April 10, 2002. Workers' families also took part, and participants realized anew the importance of protecting the earth's environment.

About 200 SET employees and family members helped clean up the Kaohsiung beach in Taiwan. (SET in Taiwan)

Social Report

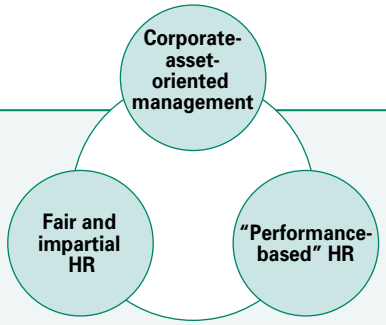
Economic Report

Forming Relationships with Individuals and Society

1 Relationships with Employees

Basic HR (Human Resources) Policy

◎ Implement a corporate-asset-oriented management strategy which values the experience and technical skills of each of our employees.
◎ Carry out flexible personnel placement with a focus on "putting the right employee in the right position," without favor or partiality.
◎ Increase the abilities of our personnel and the competitiveness of the company through a new HR system founded on a "performance-based" policy.



① An HR System Allowing Employees to Use Their Initiative

"Challenge Course"

In order to implement a systematic educational program for our executive management in Japan, we introduced the Sharp Leadership Program in 2001. This program is an educational system designed for employees in junior executive to division manager positions.
The program involves training for each level of management based on MBA* related knowledge and skills, as well as career development opportunities, including overseas assignment and participation in key projects. The goal of this program is to cultivate leadership and management abilities in line with global management levels.
The "Challenge Course", which is geared toward junior executives, eliminates the seniority-based system in favor of a performance-based wage system (on a monthly basis) and promotion. This system motivates junior managers to develop their abilities and take responsibility for their performance, enabling and encouraging swift advancement to senior positions.

* MBA: Masters of Business Administration

Software and network technology training for the information age

Recruitment-Based HR System

When a new company project, which is deemed highly important, arises such as starting up a new facility or developing a new technology, human resources for this project are recruited throughout the company by the division in need. Any employee who wants to join the new project can apply for the position. This system ensures optimal placement of human resources.
Since positions in new ventures are advertised every month, motivated employees always have a chance to improve their abilities and advance their career.
This system offers a timely and flexible method of assigning human resources throughout the company and maximizes each employee's contribution.
In fiscal year 2001, recruitment was conducted for approximately 40 projects, resulting in around 100 employee transfers in Japan.

Application-Based HR System

This is a system wherein each year every employee is given the chance to apply for a change of job classification or work location. This system allows employees to custom tailor their careers and abilities, thereby enabling the company to achieve optimal placement of human resources.

② Expanding Opportunities for Women

"Recruitment-Based Active Woman Course"

Sharp actively pursues affirmative action aimed at increasing work opportunities for female employees. As part of this program, Sharp has established a new section within the Recruitment-Based HR system solely devoted to expanding company-wide work opportunities for women in order to ensure optimum personnel placement in Japan.

Up until now, recruitment has been offered for the following projects in order to help create new opportunities for women:

- Product planning from women's perspective
- Judging product usefulness from a homemaker's perspective
- Education of women sales engineers

Sharp is currently considering more ways to expand these activities.

The Human Resource Development Center is entrusted with the task of globally cultivating human resources capable of leading Sharp into the future. (Tenri, Nara Prefecture)

③ Employment Initiatives for the Physically and Mentally Challenged

Initiatives

Sharp's commitment to the physically and mentally challenged dates back to 1950, with the founding of Sharp Tokusen Industry Co., a special subsidiary specifically for the handicapped. Sharp remains committed to achieving the handicap employment quotas required by Japanese law and creating a worker-friendly environment for handicapped employees.
In 2001, our handicap employment rate reached 1.85%, surpassing the quota mandated by Japanese law (1.8%) in Japan.

● Sharp Tokusen Industry Co.

In 1942 a separate factory was founded for the purpose of providing blind soldiers a place to work in Japan. This factory later became the Hayakawa Special Metals Factory in 1950 and continues operation to this day. In addition to its longtime activities of fabricating electronic parts and PC boards, recently the corporation has stepped into the information age with undertakings such as document digitization and website creation. Even now the company is expanding ways in which the physically and mentally challenged may work.

The company was spun off as a special partnership corporation in 1950 with capital of 150,000 yen. This picture shows the Special Factory in 1950.

Other Support for the Physically and Mentally Challenged

Sharp strives to assist the handicapped in other ways, including donating administration funds for groups (Ikutokuen and others) and helping to sponsor events held by welfare organizations (Hayakawa Welfare Hall and others). In the future, Sharp will continue playing a part as a responsible member of society by supporting the handicapped to be more independent.

④ Internships

Business Internships

In order to provide humanities majors with an opportunity to experience business firsthand and to help them learn to think in a business-like fashion, Sharp introduced in fiscal year 2001 a system for business internships.
In fiscal year 2001, about 20 students received advice and instruction over the course of two weeks in fields such as accounting, law, intellectual property rights, and marketing research in Japan.

Technical Internships

Sharp also provides technical internships in order to provide university and technical college students opportunities to experience R&D and product development as practiced in an actual private company, and to help nurture them into researchers capable of a perspective broader than just their particular specialty.
In fiscal year 2001, about 40 students from universities across Japan majoring mostly in electronics, information, and mechanical fields, experienced firsthand the actual processes involved in R&D and product design in our facilities.

An intern receiving software development instruction from an employee

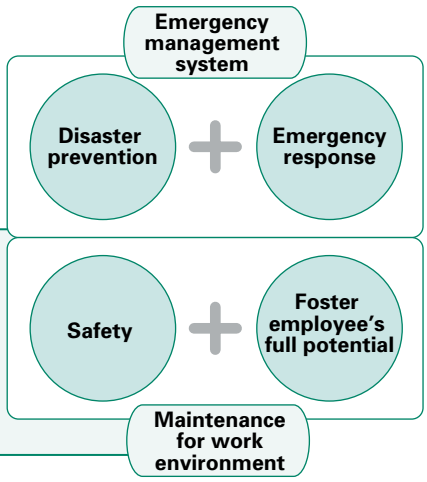
⑤ Cultural Activities

Helping Support The Asian Pacific Awards

Sharp proudly helps support The Asian Pacific Awards (sponsored by *Mainichi Shinbun*), a well-respected prize awarded to outstanding works in the fields of politics, economics, and culture in the Asian and Pacific region. The Asian Pacific Award's 13th Awards Ceremony was held in November 2001, and was attended by Sharp Vice President Aramoto, who presented the recipients with their awards.

Award recipients and officials

2 Contributing to Safety and Health



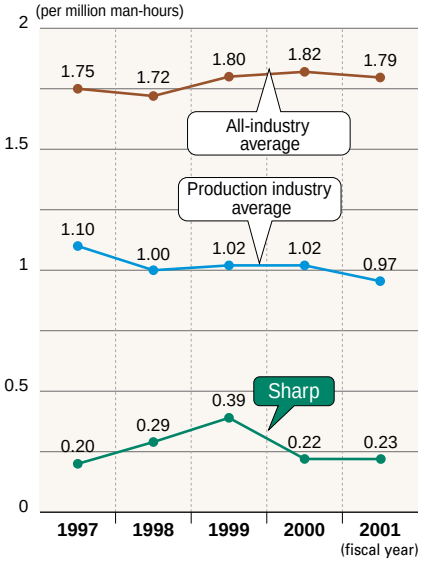
Behavior guidelines: Secure a safe working environment for the well being of all our employees

(1) We place the highest value on human life. Therefore, we actively seek to strengthen our emergency preparedness through extensive use of disaster and accident prevention measures as part of a comprehensive emergency management system.
(2) In addition to full compliance with safety and health laws wherever we operate, at home or overseas, Sharp strives to create a "safety-first and worker-friendly" environment for all its employees so that they can maximize their full potential.

① Current Safety and Health Efforts

In order to improve safety and health, Sharp has established "Behavior Guidelines" based on the "Sharp Business Standards". Since the type of products and chemical substances differ for each Sharp site, safety management standards for each site are determined based upon that location's needs and local requirements. These standards are then used in conjunction with industrial accident prevention measures. Sharp's industrial accident occurrence rate for fiscal year 2001 in Japan was 0.23 incidents per million man-hours, a rate which is lower than the average for all industries and manufacturing industries. We are not satisfied with this performance, however, and have established a goal of zero industrial accidents.

● Industrial accident occurrence rates



* Averages for all industries and production industries are based on the Health, Labor and Welfare Ministry's industrial accident trend survey.

② Individual Efforts at Each Site

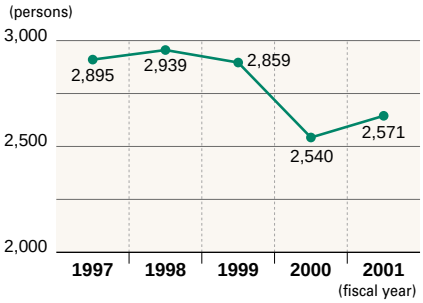
Over and above the legal requirement set forth in the Japan Labor Standards Law and the Worker's Safety and Health Law, each of our sites has established a goal of a zero accident rate and sets concrete goals in its safety and health-related activities. However, each site shares in safety management efforts whose goal is to heighten safety awareness among employees, eradicate unsafe behavior, and make all of our facilities even safer than they already are. In terms of concrete actions, periodic safety patrols and other types of specialized activities are carried out. Also, we hold slogan and poetry contests to heighten the safety awareness of our employees.

The position and status of fire extinguishers and other safety equipment is checked.

③ Contributing to Society Through Blood Donation

We do everything possible to prevent industrial accidents, but in case they do occur there is a possibility that a blood transfusion would be required. In this age in which blood transfusions are a necessity for much medical care, the donation of blood is a matter of mutual cooperation. In order to promote accident prevention awareness and volunteerism, Sharp conducts semiannual blood drives at each of its sites, resulting in the participation of thousands of people in Japan.

● Blood drive participation



Many employees give in the semiannual blood drive.

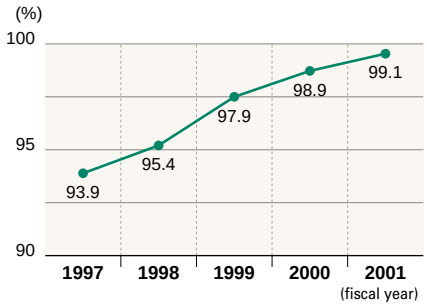
④ Efforts to Promote Better Physical Health for Employees and Their Families

As part of its general program to encourage better physical health, Sharp enacted "Healthy Sharp 21" to promote better well being among its employees and their families in Japan. "Healthy Sharp 21" is built around the following three pillars, which aim to support healthy living on a permanent basis:

1) Voluntary participation to improve physical well being (Strengthening primary prevention efforts)
2) Individual guidance based on data (Active secondary prevention)
3) Creation of a health network

The basis for all these efforts is the company yearly physical checkup, and the participation rate in fiscal year 2001 was 99.1%. Sharp is presently considering measures to attain 100% participation, such as making better notifications of the checkup days and increasing the opportunities for participants.

● Physical checkup participation rates



◎Structure of "Healthy Sharp 21"

● 1) Voluntary Participation to Improve Physical Well Being Program (primary prevention efforts)

Motivating lifelong physical health

- Nutrition and diet
- Exercise
- → Disease risk (lifestyle diseases)

Measured goals

- Increasing habitual exercise
- Appropriate nutrition and calorie intake
- Improve lifestyles and reduce lifestyle diseases

Company-wide campaign for good physical well being

Implementation strategies

Promoting exercise

- Conduct more stretching exercises in plants
- Sponsor walking events
- Sponsor sports classes
- Hold recreational sports activities
- Hold various athletic tournaments
- Provide various event information

Offering physical fitness information

- Health challenge activities (offering information on diet, exercise, etc.)
- Sponsoring health seminars
- Offering information on health and fitness

● 2) Individual Guidance Based on Data (robust secondary prevention)

Motivating lifelong health wellness

- Increasing number of cases
- **Lifestyle disease prevention corps** (a dramatic improvement can be expected by improving lifestyles)
- **Subjective and objective symptoms present** (worsening can be prevented by medication and lifestyle improvement)

Measured goals

- Improve lifestyles and reduce lifestyle diseases
- Reduce cases of high cholesterol and diabetes

Healthy society campaign develops

Implementation strategies

Expanding health guidance

- Individual guidance for high cholesterol potentials
- Individual guidance for lifestyle disease patients
- Sponsor health education meetings
- Actively promote diet and exercise therapy; share examples of past successes

Health guidance for sites lacking a health management office

- Institute a roving health counselor
- Follow up with cases through e-mail and other forms of guidance

3 Contribution to Society

1. Sharp's Efforts as an Environmental Citizen

In order to raise the environmental citizen awareness of each of its employees, Sharp conducts environmental activities at each of it sites meant to contribute to the local community.
We want to contribute to society by having employees think for themselves about environmental protection and act accordingly.

① Cleaning Up the Local Environment

Volunteer Clean-Up Activities

As part of its "Green Mind Campaign," Sharp has been conducting environmental citizen activities on a monthly basis since 1998. This includes the periodic trash clean-up of the environment around all of Sharp sites throughout the country.
Sharp has been conducting environmental citizen activities at its headquarters since 1994. At Sharp No. 2 Plant in Fukuyama, Sharp employees clean up the road from the factory to the nearest train station, giving them an opportunity to increase their environmental and social awareness. This kind of commuting road and highway cleanup activity is useful both for nurturing the environmental consciousness of those employees who participate and for providing a good forum of communication with the local residents.
Sharp also takes part actively in clean-up activities sponsored by local governments as way of contributing to the local environmental protection as a local company.

Clean-up activities also serve as a good forum to communicate with the local residents.

Result

A total of 520 kg of garbage was collected

Yamato River Clean-Up Campaign

The Yamato River in Japan is a Class A river whose waters originate in the Kasagi mountain range, and then join tributaries in the Nara basin before flowing eventually into Osaka Bay. However, according to a study by the Ministry of Land, Infrastructure, and Transport, the water quality (BOD value) of this river is the worst of all Class A rivers in Japan.

Employees and their family members taking part in clean-up near the Katsuragi River in Nara Prefecture's Gose City.

In March 2002, a "Yamato River Clean-Up Campaign" was sponsored by the Kinki Regional Development Bureau and the Nara Newspaper. For this event, local governmental bodies and volunteers came together at 10 locations within the Osaka region and 5 locations within Nara Prefecture over 2 days to clean up the area around the river. Sharp has three sites in Nara, so we advertised for volunteers through the corporate intranet, resulting in Sharp employees participating at the Furu River and Katsuragi River locations.
Sharp will continue to participate in local volunteer activities both to contribute to the environment and to deepen communication with local residents.

② Stimulating Environmental Protection Awareness

"Green & Green Summer Festival"

In August 2001 we sponsored an environmental event called the "Green & Green Summer Festival" at our Tokyo branch in Makuhari. Many environmental activities were carried out at this festival, including a class on how to build a mini solar car and the showing of environmental movies, all of which contributed to heightening environmental awareness.

A mini solar car class using photovoltaic cells

Learning First-Hand How to Build Photovoltaic Cells

At the Advanced Development and Planning Center in Tenri, we held "Summer Vacation Family Learning" events in July and August 2001. As a part of these events, parents and children both learned how to make photovoltaic cells. The engineering department organized this event, and used dye sensitizing organic photovoltaic cells now under development as a theme to help adults and children have fun while learning.

An activity using American cherries was carried on the front page of the *Yomiuri* newspaper, earning a wide response.

③ Cooperation with Government

The Ecomesse (Ecofair) Chiba event in "Makuhari New City" has been held here in Japan every year since 1996. Planned jointly by private enterprise, citizens, and government, this event serves as a forum for announcing environmental protection activities.
Sharp has always been involved as a central member of the Planning Committee, and its employees also volunteer to help run the event. In fiscal year 2001, Sharp announced proposals for a residential photovoltaic power system and created an exhibit where parents and children crafted solar cars together.

Main gate of the fiscal year 2001 Ecomesse Chiba


Exhibit for teaching how to build solar cars

● Events Contributed to in Fiscal Year 2001 Ecomesse Chiba

"Improving Environment Eco-Park" (10/13), "Environment Symposium 2001, Chiba Conference" (10/21), "Environmental Planning Seminar" (10/26), "Eco-Bazaar/Eco-Exhibit/Eco-Stage (Environment Ultra-Quiz) (11/3-4), "Eco-Restaurant (hotel) (11/4), "Children's Environment Conference Chiba 2001" (11/4), "Bay Town Forum, Vol. 4" (11/10), "WBG Atrium Concert" (10/16, 11/5)

2. Sharp's Efforts as a Corporate Citizen (Relationships with Local Communities)

Sharp is working with local communities to achieve mutually beneficial results by implementing various programs at each of its sites with the goals of improving culture and welfare. Sharp wants to fulfill its duty as a good corporate citizen both domestically and overseas through relationships with local communities.

① Accepting Company and Factory Visits

Part of Sharp's activities in promoting corporate citizenship is to encourage field trips and other visits to company offices and plants.
In Japan, Sharp assists in planning student educational and guidance activities during summer vacation, and opens its facilities, including High-Tech Hall at the Tokyo branch in Makuhari and the Memorial and Technology Halls at the Advanced Development and Planning Center in Tenri, for use in these programs. Sharp also receives visits from government-related personnel at the Mie facility and many other sites around the world.

② Opening Benefit Facilities to the Public

Sharp also opens up its employee baseball and soccer fields, tennis courts, and gyms for use by local groups such as Little League baseball, soccer, and volleyball teams.

③ Sharp Festivals

Sharp holds festivals and athletic events for its employees and their families, and has been welcoming the public to some of these events for more than 10 years.
Recently the number of events sponsored jointly by Sharp and local communities has been on the rise. These events, which have become a tradition in many places, form a superb forum for communication with the local residents in the cities and towns where we maintain our sites.

Festivals where communications between employees and local residents occurs.

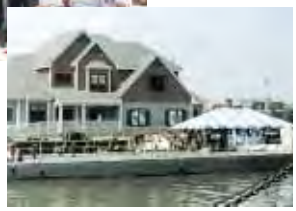

Many festivals have become tradition in their locales.

④ Global Support and Sponsorship

For the past 20 years, the Sharp Manufacturing Company of America (SMCA)*1 has participated in the "Career Day" of schools in Memphis by conducting classes and donating audio-visual equipment. Also, Sharp Electronics Corporation (SEC)*2 became a sponsor of "Jan's House of Hope," a show-house on the water, as part of a summer 2001 campaign sponsored by The National Cancer Awareness Foundation. This exhibit traveled by boat to various main cities on the east coast of the U.S.A., conducting hospice-related public relations activities and raising contributions for the cause. These activities were covered by the mass media, including NBC and USA Today.

*1 Sharp's manufacturing company in America
*2 Sharp's sales company in America


Introducing SMCA at class


"Jan's House of Hope" touring the east coast of the U.S.A.

Business Summary

1 Business Strategies for Continued Growth

① Four Key Business Domains

Sustained growth demands ongoing structural business reform to respond to external change. To promote such reform, Sharp first narrowed its focus to four key business domains to define the general direction that reform would take.

Entertainment & Communication

Sharp aims to create products with original features that entertain and excite customers, and deliver rich, vivid communication possibilities. In doing so, Sharp makes use of its advanced technical expertise in the development of one-of-a-kind LCDs, high-quality AV, compact and lightweight products.

In a separate initiative within this domain, Sharp's "Digital New Life" concept aims to realize a fusion of entertainment and communication in innovative, network products, based on core broadband and wireless technologies.

Eco-Life

A key objective of 21st century society is the creation of secure, healthy leisure and living styles that are compatible with the global environment. Using its expertise in areas such as Plasmacluster Ion and vacuum ultrasonic washing technologies, Sharp aims to shift its product mix from traditional "white goods" to the more eco-friendly category of "green goods." The global development of Sharp's photovoltaic power systems business is another aspect of this drive to contribute to the realization of the "Eco-Life" concept.

Business Solutions

Besides hardware, Sharp is focused on the development of a greater presence in high-value-added business solutions, including software, consulting and other services. Building on its systems equipment business, such as POS terminals, Sharp is developing its original data-processing technology and advanced devices, creating novel solutions that make use of such products.

Next-Generation Electronic Components

Sharp's focused development of next-generation electronic components aims to take the competitive edge and advanced technology embodied in its one-of-a-kind products to a higher level in the realization of strategic product concepts such as "Digital New Life" and "Eco-Life."

② Nine Business Areas of Strategic Focus

Within four domains, Sharp selected nine business areas of strategic focus in which the company could maximally leverage its competitive advantage. Sharp prioritizes investment resources within these areas.

LCD Color Televisions

Sharp seeks to offer new applications for its LCD color televisions by adding broadband and network capabilities to its range of lightweight, thin-profile products.

1-Bit Digital Audio

Besides developing its 1-bit digital audio business globally, Sharp strives to extend the application of 1-bit technology to new non-audio product areas, such as video, information and communications equipment.

Home Networks

Sharp is developing original products to supply prospective areas of demand stemming from the ongoing fusion of broadcasting and communications, and the spread of broadband. This business area also includes the system support and other services associated with the construction of home networks.

Mobile Communications Terminals

Alongside the development of mobile phones designed for next-generation services, Sharp is strengthening its alliances with overseas carriers and working to construct highly effective development, sales and customer service operations that target the global market.

Green Devices

In order to expand its "green devices" business, Sharp is developing new products incorporating such devices as well as promoting its original "green devices" in other business sectors.

Photovoltaic Power Systems

Amid rising environmental concerns worldwide, Sharp seeks to develop its photovoltaic power systems business globally.

Business Solutions

Sharp aims to open up markets for products and services that provide novel applications through the combination of original hardware and devices with unique applications and technical expertise.

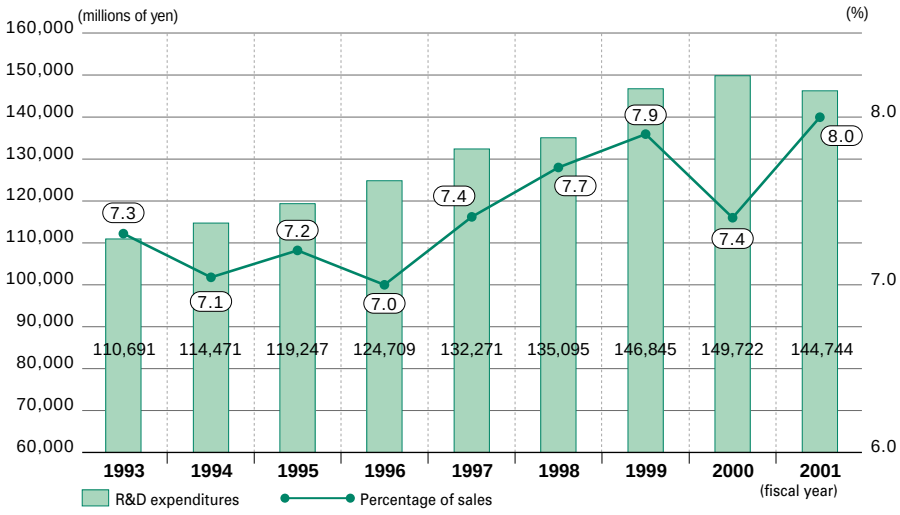
IC Cards

IC cards, which utilize Sharp's original security-related functions, are positioned to be one of the key devices in a networked society, offering applications in areas as diverse as finance, traffic control, education and medical service.

System LCDs

System LCDs promise to be a key component as ubiquitous networks proliferate. Sharp aims to expand its System LCD business in this promising area.

●R&D Expenditures (consolidated)



2 Summary for the Current Period

1 Review of Fiscal 2001

Extremely harsh economic conditions prevailed in Japan in the fiscal year that ended in March 2002. Consumer spending stagnated amid rising unemployment and income deterioration, while capital investment fell. Overseas, economies in America, Europe and Asia entered a downturn. The recession deepened as terrorists struck on American soil. Although signs of recovery began to emerge in the United States toward the end of fiscal year 2001, the overall economic environment remained unremittingly poor, at a historic nadir.

We responded to these testing conditions by returning to our roots as a manufacturer dedicated to making a contribution to society through the creation of valuable products. We redoubled efforts to create one-of-a-kind products applicable to modern needs and to develop the original electronic device technology behind such advances. Examples of one-of-a-kind products that we marketed aggressively during fiscal 2001 included the following: our AQUOS range of LCD color televisions; 1-bit digital audio products, which offer super-high-fidelity sound reproduction; a range of ultra-thin-profile, super-lightweight notebook computers; and mobile phones equipped with TFT LCDs and digital cameras.

In the electronic components field, we accelerated development of devices such as wide-viewing-angle, high-response-speed ASV LCDs and reflective LCDs that boast ultra-low power consumption. We also made progress in expanding our business in areas such as high-end CMOS imagers for mobile phones and solar cells.

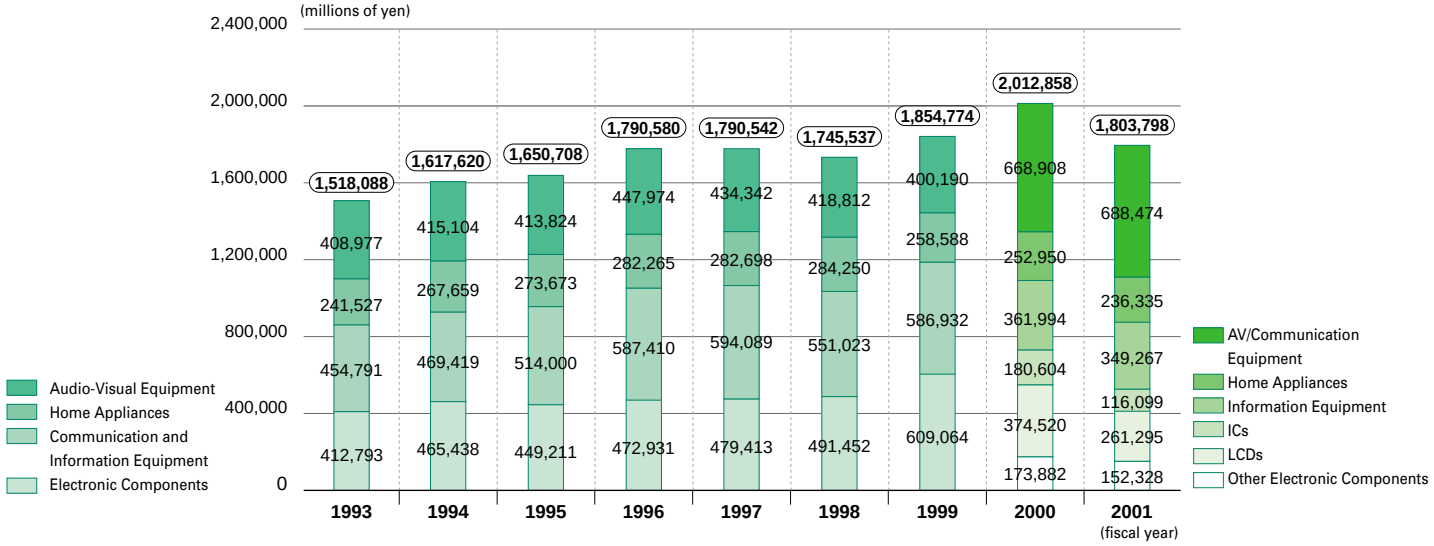
The decline in consumer spending in Japan was the primary factor depressing our domestic sales, which fell 14.4% year on year to ¥983.6 billion. The global economic slowdown also impacted our overseas sales, which declined 5.0% to ¥820.1 billion. Total consolidated net sales declined 10.4% to ¥1,803.7 billion. Operating income fell 30.5% year on year to ¥73.5 billion. Reflecting a steep decline in the Japanese stock market during fiscal 2001, we posted losses related to the sales and valuation of investment securities, principally banking stocks. This contributed to a 70.6% fall in net income to ¥11.3 billion.

2 Strategies for Future

We aim to expand our presence in global markets with our improved line-up of LCD color televisions. We are constructing a state-of-the-art manufacturing plant in Kameyama, Mie Prefecture, for the integrated production of large LCD color TVs. We are also expanding our mobile phone business through the launch of new, next-generation handsets as well as developing businesses both in Japan and Western markets. In home appliances, we are generating fresh growth by moving into higher value-added market segments with original products based on our unique technologies such as Plasmacluster Ion technology.

In our LCD business, our objective is to strengthen our competitiveness in all areas. Besides establishing unique proprietary LCD technologies, we are also developing our own production technologies and pursuing an aggressive patent strategy. In System LCDs, an area with particular potential, we will begin mass-production at our Tenri Plant, and we are building the Mie No. 3 Plant. In our IC and electronic component business, we are speeding up the process of refocus and consolidation so that we can fortify development of original components in growth segments. Finally, we continue to build on our leading presence in the global market for electronic components such as photovoltaic power systems. As environmental concerns increase worldwide, this is another area where we expect growth.

● Sales by Product Group (consolidated)



Environmental Data by Business Site in Japan

Tochigi Site

Location : **Yaita, Tochigi**
Site area : **326,000m²**
Started operation : **April, 1968**
Related group : **Audio-Visual Systems Group**

Atmosphere measurements

Emitting facilities	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Boiler	SOx	K Value	17.5	17.5	6.0	0.13
	NOx	ppm	250	250	170	110
	Soot and dust	mg/Nm³	300	300	80	3

Water quality measurements (water pollution control law)

Classification	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Parameters affecting the community environment	pH	—	5.8 to 8.6	5.8 to 8.6	6.0 to 8.0	6.8 to 7.5
	BOD	mg/ℓ	160	25	10	2.8
	COD	mg/ℓ	160	25	–	–
	Suspended solid (SS)	mg/ℓ	200	50	15	4.4
	n-Hexane extractives (mineral oil)	mg/ℓ	5	5	–	–
	n-Hexane extractives (vegetable oil)	mg/ℓ	30	10	–	–
	Phenols	mg/ℓ	5	1	–	–
	Copper	mg/ℓ	3	3	–	–
	Zinc	mg/ℓ	5	5	–	–
	Dissolved iron	mg/ℓ	10	3	–	–
	Dissolved manganese	mg/ℓ	10	3	–	–
	Total chromium	mg/ℓ	2	2	–	–
	Fluorine	mg/ℓ	15	8	–	–
	Coliform organisms	Unit/mℓ	3,000	3,000	100	0
	Total nitrogen	mg/ℓ	120	20	–	–
	Total phosphorus	mg/ℓ	16	2	–	–

• No measurement (-) denotes parameters that don't need to be measured since no corresponding harmful substances are used.
• Health parameters have no record of actual use.

PRTR

• No PRTR substances have 500 kg or more handling quantity.

Noise/vibration measurements

	Classification	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
			Regulations (prefectural)	Sharp standard	
Noise	Morning	dB	65	–	–
	Afternoon	dB	70	65	61.9
	Evening	dB	65	–	–
	Night	dB	60	–	–
Vibration	Day	dB	65	60	30
	Night	dB	60	–	–

• No measurement (-) denotes no need for measurement since related facilities are not operating during the period of time.

COD, nitrogen, phosphorus emission

• No emission of COD, nitrogen or phosphorus to the lakes or seas for which emission standards are instituted.

Yao Site

Location : **Yao, Osaka**
Site area : **132,330m²**
Started operation : **July, 1959**
Related group : **Appliance Systems Group**

Atmosphere measurements

Emitting facilities	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Boiler	NOx	ppm	150	150	60	33
	Soot and dust	mg/Nm³	50	50	15	3

Water quality measurements (sewerage law)

Classification	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (municipal)	Sharp standard	
Parameters affecting the community environment	pH	—	5.7 to 8.7	5.7 to 8.7	6.1 to 7.9	6.8 to 7.7
	BOD	mg/ℓ	300	300	150	110
	COD	mg/ℓ	–	–	–	–
	Suspended solid (SS)	mg/ℓ	300	300	150	120
	n-Hexane extractives (mineral oil)	mg/ℓ	5	5	3	2.0
	n-Hexane extractives (vegetable oil)	mg/ℓ	30	30	10	11
	Phenols	mg/ℓ	5	5	–	0.005
	Copper	mg/ℓ	3	3	–	0.022
	Zinc	mg/ℓ	5	5	2.5	1.8
	Dissolved iron	mg/ℓ	10	10	–	0.64
	Dissolved manganese	mg/ℓ	10	10	1	0.15
	Total chromium	mg/ℓ	2	2	–	0.04
	Fluorine	mg/ℓ	15	15	5	0.7
	Coliform organisms	Unit/mℓ	–	–	–	–
	Total nitrogen	mg/ℓ	–	–	–	–
	Total phosphorus	mg/ℓ	–	–	–	–

• No measurement (-) denotes parameters that are not regulated or don't need to be measured.
• The following health parameters were all below detectable limits (essentially not detected): Cadmium and its compounds, total cyanide, organophosphorous pesticide, lead and its compouds, hexavalent chromium, arsenic and its compounds, total mercury, alkylmercuric compound, PCBs, trichloroethylene, tetrachloroethylene, dichloromethane and cis-1, 2-dichloroethylene.

PRTR totalization

(kg)

PRTR No.	Chemical	Handling quantity	Emission			Transportation		Consumption	Removal	Recycle
			To atmosphere	To public service water	Underground/ fill-up	To sewage	Out of site			
85	Chlorodifluoromethane (HCFC-22)	6,763.00	329.00	0.00	0.00	0.00	260.00	6,174.00	0.00	0.00

Malodorant substance measurements

Malodorant substance	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
		Laws (national)	Sharp standard	
Acetaldehyde	ppm	Site boundary 0.05*	Chimney 1.0	Chimney less than 0.03

*893 ppm calculated in terms of chimney location

COD, nitrogen, phosphorus emission

• No emission of COD, nitrogen or phosphorus to the lakes or seas for which emission standards are instituted.

Hiroshima Site

Main Plant

Location : Higashi-Hiroshima, Hiroshima
Site area : 81,500m²
Started operation : June, 1967
Related groups : Communication Systems Group/Audio Systems Division, Audio-Visual Systems Group

No.3 Plant

Location : Higashi-Hiroshima, Hiroshima
Site area : 47,500m²
Started operation : June 1986
Related groups : Electronic Components Division, Electronic Components Group

Atmosphere measurements

Emitting facilities	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Boiler	SOx	K value	3.8	–	1.0	0.11
	NOx	ppm	180	–	150	75
	Soot and dust	mg/Nm³	300	–	60	10

Water quality measurements (water pollution control law)

Classification	Parameter	Unit	Maximum permissible quantity				Fiscal year 2001 measured value (max.)	
			Laws (national)	Regulations (prefectural)	Sharp standard			
					Main plant	No.3 plant	Main plant	No.3 plant
Parameters affecting the community environment	pH	—	5.8 to 8.6	5.8 to 8.6	5.8 to 8.0	6.5 to 8.5	7.5	7.9
	BOD	mg/ℓ	160	160	21	5	19.6	4.9
	COD	mg/ℓ	160	50	39	15	38.1	14.8
	Suspended solid (SS)	mg/ℓ	200	90	50	10	20.5	8
	n-Hexane extractives (mineral oil)	mg/ℓ	5	5	–		–	
	n-Hexane extractives (vegetable oil)	mg/ℓ	30	8	–		–	
	Phenols	mg/ℓ	5	5	–		–	
	Copper	mg/ℓ	3	3	–		–	
	Zinc	mg/ℓ	5	5	–		–	
	Dissolved iron	mg/ℓ	10	10	–		–	
	Dissolved manganese	mg/ℓ	10	10	–		–	
	Total chromium	mg/ℓ	2	2	–		–	
	Fluorine	mg/ℓ	15	15	–		–	
	Coliform organisms	unit/mℓ	3,000	3,000	1,000		60	54
	Total nitrogen	mg/ℓ	120	120	60		52.1	31.9
	Total phosphorus	mg/ℓ	16	6	8		6.39	3.58

• No measurement (-) denotes parameters that are not regulated or don't need to be measured.
• Health parameters have no record of actual use.

PRTR

• No PRTR substances have 500 kg or more handling quantity.

Noise/vibration measurements (main plant)

	Classification	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
			Regulations (prefectural)	Sharp standard	
Noise	Morning	dB	70	–	–
	Afternoon	dB	70	60	57.7
	Evening	dB	70	–	–
	Night	dB	65	–	–

• No measurement (-) denotes no need for measurement since related facilities are not operating during the period of time.

Noise/vibration measurements (No.3 plant)

	Classification	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
			Regulations (prefectural)	Sharp standard	
Noise	Morning	dB	60	58	45.8
	Afternoon	dB	60	58	50.9
	Evening	dB	60	58	52.9
	Night	dB	50	48	47.3

Malodorant substance measurements (Composting facility)

Malodorant substance	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
		Regulations (prefectural)	Sharp standard	
Hydrogen sulfide	ppm	0.020	0.010	0.001

• The following substance was all below detectable limits (essentially not detected): Ammonia

COD, nitrogen, phosphorus emission

	Unit	Fiscal year 2001 measured value
COD	t	0.70
Nitrogen	t	0.77
Phosphorus	t	0.15

Nara Site

Location : Yamato-Koriyama, Nara
Site area : 119,949m²
Started operation : 1960
Related group : Information Systems Group/Digital Document Systems Group/ Mobile LCD Group

Atmosphere measurements

Emitting facilities	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Boiler	SOx	K value	17.5	17.5	1.0	0.12
	NOx	ppm	180	180	135	88
	Soot and dust	mg/Nm³	100	100	50	2

Water quality measurements (water pollution control law)

Classification	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Parameters affecting the community environment	pH	—	5.8 to 8.6	5.8 to 8.6	6.0 to 8.4	6.4 to 8.2
	BOD	mg/ℓ	160	70	20	4
	COD	mg/ℓ	160	160	20	17
	Suspended solid (SS)	mg/ℓ	200	100	20	2
	n-Hexane extractives (mineral oil)	mg/ℓ	5	5	2	–
	n-Hexane extractives (vegetable oil)	mg/ℓ	30	30	2	Not detected
	Phenols	mg/ℓ	5	5	1	0.3
	Copper	mg/ℓ	3	3	0.05	0.04
	Zinc	mg/ℓ	5	5	1	0.07
	Dissolved iron	mg/ℓ	10	10	3	0.37
	Dissolved manganese	mg/ℓ	10	10	1	0.36
	Total chromium	mg/ℓ	2	2	0.1	Not detected
	Fluorine	mg/ℓ	15	15	10	2.8
	Coliform organisms	unit/mℓ	3,000	3,000	2,500	260
	Total nitrogen	mg/ℓ	120	120	60	11
	Total phosphorus	mg/ℓ	16	16	8	0.81
Health parameter	Nitrate nitrogen, nitrite nitrogen,ammonia nitrogen	mg/ℓ	100	100	50	7.1

• No measurement (-) denotes parameters that are not regulated or don't need to be measured.
• The following health parameters were all below detectable limits (essentially not detected): Cadmium and its compounds, total cyanide, lead and its compounds, hexavalent chromium, total mercury, trichloroethylene, tetrachloroethylene, carbon tetrachloride, 1, 2-dichloromethane, 1, 1, 1-trichloroethane, benzene, selenium and its compounds, boron and its compounds.

PRTR totalization

(kg)

PRTR No.	Chemical	Handling quantity	Emission			Transportation		Consumption	Removal	Recycle
			To atmosphere	To public service water	Underground/ fill-up	To sewage	Out of site			
68	Chromium and trivalent chromium compounds	658.79	0.07	0.00	0.00	0.00	131.71	527.01	0.00	0.00
101	2-Ethoxyethyl acetate	9,196.06	459.81	0.00	0.00	0.001	8,736.25	0.00	0.00	0.00
224	1, 3, 5-Trimethyl benzene	901.60	90.17	0.00	0.00	0.00	0.00	0.00	0.00	811.43
230	Lead and its compounds	5,885.20	0.00	0.00	0.00	0.00	117.72	5,767.48	0.00	0.00
252	Arsenic and its inorganic compounds	1,231.33	0.00	0.00	0.00	0.00	172.40	176.19	13.26	869.48
283	Hydrogen fluoride and its water-soluble salts	3,765.92	0.00	338.94	0.00	0.00	0.00	0.00	3,426.98	0.00
311	Manganese and its compounds	1,545.97	0.01	0.00	0.00	0.00	28.55	1,517.40	0.00	0.00

Noise/vibration measurements

	Classification	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
			Regulations (prefectural)	Sharp standard	
Noise	Morning	dB	50	50	48
	Afternoon	dB	60	60	58
	Evening	dB	50	50	48
	Night (Midnight)	dB	45	45	44
Vibration	Afternoon	dB	60	60	53
	Night	dB	55	55	46

Malodorant substance measurements

Malodorant substance	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
		By agreement (municipal)	Sharp standard	
Ammonia	ppm	5.0	0.5	0.13
Hydrogen chloride	ppm	–	0.1	0.054

• The following substances were all below detectable limits (essentially not detected):
Ethyl acetate, methyl isobutyl ketone, toluene, styrene, xylene and 1, 3, 5-trimethyl benzene

COD, nitrogen, phosphorus emission

	Unit	Fiscal year 2001 measured value
COD	t	3.69
Nitrogen	t	5.87
Phosphorus	t	0.50

Shinjo Site

Location : Kita-Katsuragi, Nara
Site area : 73,905m²
Started operation : March 1981
Related groups : Electronic Components Group/Solar Systems Group

Atmosphere measurements

Emitting facilities	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Water chiller/ warmer (LPG)	NOx	ppm	150	–	98	58
	Soot and dust	mg/Nm³	100	–	12	2.1

Water quality measurements (water pollution control law)

Classification	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Parameters affecting the community environment	pH	—	5.8 to 8.6	5.8 to 8.6	6.0 to 8.0	6.8
	BOD	mg/ℓ	160	25	19	9.0
	COD	mg/ℓ	160	10	8	2.8
	Suspended solid (SS)	mg/ℓ	200	90	13	Not detected
	n-hexane extractives (mineral oil)	mg/ℓ	5	5	1	Not detected
	n-Hexane extractives (vegetable oil)	mg/ℓ	30	30	–	Not detected
	Phenols	mg/ℓ	5	5	–	Not detected
	Copper	mg/ℓ	3	3	–	Not detected
	Zinc	mg/ℓ	5	5	–	Not detected
	Dissolved iron	mg/ℓ	10	10	–	0.026
	Dissolved manganese	mg/ℓ	10	10	–	Not detected
	Total chromium	mg/ℓ	2	2	–	Not detected
	Fluorine	mg/ℓ	15	8	7	3.9
	Coliform organisms	unit/m ℓ	3,000	3,000	–	Not detected
	Total nitrogen	mg/ℓ	120	120	60	47.0
	Total phosphorus	mg/ℓ	16	16	4	Not detected

• No measurement (-) denotes parameters that are not regulated or don't need to be measured.
• Health parameters have no record of actual use.

PRTR totalization

(kg)

PRTR No.	Chemical	Handling quantity	Emission			Transportation		Consumption	Removal	Recycle
			To atmosphere	To public service water	Underground/ fill-up	To sewage	Out of site			
30	Bisphenol A type epoxy resin (liquid)	994.87	0.00	0.00	0.00	0.00	9.95	984.92	0.00	0.00
40	Ethylbenzene	2,255.17	577.10	0.00	0.00	0.00	726.41	0.00	951.66	0.00
63	Xylene	12,203.52	2,426.87	0.00	0.00	0.00	4,218.80	0.00	5,529.01	28.84
64	Silver and its water-soluble salts	11,840.95	0.00	0.00	0.00	0.00	596.91	10,296.16	0.00	947.88
224	1, 3, 5-Trimethylbenzene	3,665.15	119.64	0.00	0.00	0.00	1,665.66	0.00	1,879.85	0.00
230	Lead and its compounds	7,374.54	0.00	0.00	0.00	0.00	442.54	6,932.00	0.00	0.00
283	Hydrogen fluoride and its water-soluble salts	61,306.90	0.00	579.07	0.00	863.86	10,805.41	0.00	49,058.56	0.00

Noise/vibration measurements

	Classification	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
			Regulations (prefectural)	Sharp standard	
Noise	Morning	dB	65	64	57
	Afternoon	dB	70	67	57
	Evening	dB	65	64	57
	Night	dB	55	55	54
Vibration	Afternoon	dB	65	38	28
	Night	dB	60	30	26

Malodorant substance measurements

• The following substances were all below detectable limits (essentially not detected): Ammonia, xylene

COD, nitrogen, phosphorus emission

	Unit	Fiscal year 2001 measured value
COD	t	0.53
Nitrogen	t	6.41
Phosphorus	t	0.04

Fukuyama Site

Location : Fukuyama, Hiroshima
Site area : 210,000m²
Started operation : February 1985
Related groups : Integrated Circuits Group

Atmosphere measurements

Emitting facilities	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	By agreement (municipal)	Sharp standard	
Boiler	SOx	ppb (ground-level concentration)	–	3	0.05	0.034
		K value	2.34	1.75	0.029	0.020
	NOx	ppm	150	100	100	78
	Soot and dust	mg/Nm₃	100	50	5	1.5
Other washing apparatuses	Sulfur	mg/Nm₃	–	10 (prefectural) 5.0 (municipal)	2.5	0.47

● The following health parameters were all below detectable limits (essentially not detected): Fluorine and its compounds

Water quality measurements (water pollution control law)

Classification	Parameter	Unit	Maximum permissible quantity				Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	By agreement (municipal)	Sharp standard	
Parameters affecting the community environment	pH	—	Sea5.0 to 9.0	Sea5.5 to 9.0	Sea5.8 to 8.6	6.0 to 8.4	6.4 to 7.1
	BOD	mg/ℓ	–	–	–	–	–
	COD	mg/ℓ	160	15	15	10 and less	3.7
	Suspended solid (SS)	mg/ℓ	200	200	20	10 and less	2.0
	n-Hexane extractives (mineral oil)	mg/ℓ	5	–	–	2.5 and less	Not detected
	n-Hexane extractives (vegetable oil)	mg/ℓ	30	20	–	15 and less	Not detected
	Phenols	mg/ℓ	5	5	–	2.5 and less	Not detected
	Copper	mg/ℓ	3	3	–	1.5 and less	Not detected
	Zinc	mg/ℓ	5	5	–	2.5 and less	0.02
	Dissolved iron	mg/ℓ	10	10	–	5 and less	Not detected
	Dissolved manganese	mg/ℓ	10	10	–	5 and less	Not detected
	Total chromium	mg/ℓ	2	2	–	1 and less	Not detected
	Fluorine	mg/ℓ	15	15	15	7.5 and less	6.6
	Coliform organisms	unit/m ℓ	3,000	3,000	–	BO 1,500	1
	Total nitrogen	mg/ℓ	120	120	–	40	28
	Total phosphorus	mg/ℓ	16	16	–	1 and less	0.13
Health parameter	Nitrate nitrogen, nitrite nitrogen, ammonia nitrogen	mg/ℓ	100	100	100	40	6.14

• No measurement (-) denotes parameters that are not regulated or don't need to be measured.
• The following health parameters were all below detectable limits (essentially not detected): Cadmium and its compounds, cyanides, organophosphorus pesticide, lead and its compounds, hexavalent chromium compounds, arsenic and its compounds, total mercury, alkylmercury compound, PCBs, trichloroethylene, tetrachloroethylene, dichloromethane, carbon tetrachloride, 1, 2-dichloroethane, 1, 1-dichloroethylene, cis-1, 2- dichloroethylene, 1, 1, 1-trichloroethane, 1, 1, 2-trichloroethane, 1, 3-dichloropropane, thiuram, simazine, thiobencarb, benzene, selenium and its compounds, boron and its compounds.

PRTR totalization

(kg)

PRTR No.	Chemical	Handling quantity	Emission			Transportation		Consumption	Removal	Recycle
			To atmosphere	To public service water	Underground/ fill-up	To sewage	Out of site			
16	2-Aminoethanol	132,423.20	1,986.36	0.00	0.00	0.00	130,436.84	0.00	0.00	0.00
101	2-Etoxiethyl acetate	3,094.23	2,357.79	0.00	0.00	0.00	736.44	0.00	0.00	0.00
172	N.N-dimethylformamide (DMF)	38,985.00	6.96	0.00	0.00	0.00	2,891.04	0.00	36,087.00	0.00
260	Pyrocatechol (or catechol)	755.13	0.00	0.00	0.00	0.00	755.13	0.00	0.00	0.00
266	Phenol	7,650.00	2,998.78	0.00	0.00	0.00	4,651.22	0.00	0.00	0.00
283	Hydrogen fluoride and its water-soluble salts	155,716.24	0.00	22,158.34	0.00	0.00	0.00	0.00	133,557.90	0.00

Noise/vibration measurements

	Classification	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
			By agreement (municipal)	Sharp standard	
Noise	Morning	dB	50	50	49.0
	Afternoon	dB	55	55	49.9
	Evening	dB	50	50	49.4
	Night	dB	45	45	44.7*
Vibration	Afternoon	dB	60	45	20.6
	Night	dB	55	45	23.5

*Influenced by noise from vehicular traffic

Malodorant substance measurements

Malodorant substance	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
		Regulations (prefectural)	By agreement (municipal)	Sharp standard	
Ammonia	ppm	1.0 and less	*	0.1 and less	0.1 and less

*A written agreement between Sharp and the local municipal office stipulates that the company take enough preventive measures not to make many of neighboring dwellers feel uncomfortable.

COD, nitrogen, phosphorus emission

	Unit	Fiscal year 2001 measured value
COD	t	6.8
Nitrogen	t	83.3
Phosphorus	t	0.098

Mie Site

Location : Taki , Mie
Site area : 344,000m²
Started operation : October 1995
Related groups : AVC LCD Group/Mobile LCD Group

Atmosphere measurements

Emitting facilities	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Boiler	NOx	ppm	150	100	75	69
	Soot and dust	mg/Nm³	100	50	40	Below detectable limit of 1
	Fluorine and its compounds	ppm	–	Highly efficient disposal	3	Below detectable limit of 0.02

Water quality measurements (water pollution control law)

Classi-fication	Parameter	Unit	Maximum permissible quantity				Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	By agreement (regional)	Sharp standard	
Parameters affecting the community environment	pH	—	5.8 to 8.6	5.8 to 8.6	5.8 to 8.6	6.2 to 8.2	6.4 to 7.5
	BOD	mg/ℓ	160	20	10	1.8	1.6
	COD	mg/ℓ	160	20	10	3.1	1.1
	Suspended solid (SS)	mg/ℓ	200	200	10	0.5	Not detected
	n-Hexane extractives (mineral oil)	mg/ℓ	5	5	1	0.5	Not detected
	n-Hexane extractives (vegetable oil)	mg/ℓ	30	30	1	0.5	Not detected
	Phenols	mg/ℓ	5	5	–	–	–
	Copper	mg/ℓ	3	3	–	–	–
	Zinc	mg/ℓ	5	5	–	–	–
	Dissolved iron	mg/ℓ	10	10	–	–	–
	Dissolved manganese	mg/ℓ	10	10	–	–	–
	Total chromium	mg/ℓ	2	2	–	–	–
	Fluorine	mg/ℓ	15	15	0.5	0.1	0.1 and less
	Coliform organisms	unit/mℓ	3,000	3,000	3,000	0	0
	Total nitrogen	mg/ℓ	120	120	5	3.1	2.9
	Total phosphorus	mg/ℓ	16	16	–	–	0.9

• No measurement (-) denotes parameters that are not regulated or don't need to be measured.
• Health parameters have no record of actual use.

PRTR totalization

(kg)

PRTR No.	Chemical	Handling quantity	Emission			Transportation		Consump-tion	Removal	Recycle
			To atmos-phere	To public service water	Under-ground/ fill-up	To sewage	Out of site			
16	2-Aminoethanol	1,932,246.00	39.00	0.00	0.00	0.00	6,000.00	0.00	193,358.00	1,732,849.00
260	Pyrocatechol	4,689.00	0.00	0.00	0.00	0.00	4,589.00	0.00	100.00	0.00
283	Hydrogen fluoride and its water-soluble salts	22,289.00	0.00	0.00	0.00	0.00	0.00	0.00	3,340.00	18,949.00

Noise/vibration measurements

	Classification	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
			Regulations (prefectural)	Sharp standard	
Noise	Morning	dB	55	55	53
	Afternoon	dB	60	60	56
	Evening	dB	55	55	53
	Night	dB	50	50	49
Vibration	Afternoon	dB	65	65	20 and less
	Night	dB	60	60	20 and less

COD, nitrogen, phosphorus emission

	Unit	Fiscal year 2001 measured value
COD	t	0.97
Nitrogen	t	2.58
Phosphorus	t	0.97

Tenri Site

Location : Tenri , Nara
Site area : 220,000m²
Started operation : March 1970
Related groups : Mobile LCD Group/Integrated Circuits Group/ Corporate Research and Development Group/ Production Technology Development Group

Atmosphere measurements

Emitting facilities	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Boiler	SOx	ppb	1.06	–	0.07	0.03
	NOx	ppm	180	–	120	87
	Soot and dust	mg/Nm³	250	–	50	25
	Fluorine and its compounds	mg/Nm³	–	–	0.005	0.0008
Other washing apparatuses	Sulfuric acid	mg/Nm³	–	–	0.03	0.0163

Water quality measurements (water pollution control law)

Classi-fication	Parameter	Unit	Maximum permissible quantity			Fiscal year 2001 measured value (max.)
			Laws (national)	Regulations (prefectural)	Sharp standard	
Parameters affecting the community environment	pH	—	5.8 to 8.6	5.8 to 8.6	6.0 to 8.0	7.7
	BOD	mg/ℓ	160	70	18	15
	COD	mg/ℓ	160	160	18	14
	Suspended solid (SS)	mg/ℓ	200	100	50	5.8
	n-Hexane extractives (mineral oil)	mg/ℓ	5	5	3	Not detected
	n-Hexane extractives (vegetable oil)	mg/ℓ	30	30	3	Not detected
	Phenols	mg/ℓ	5	5	1	0.079
	Copper	mg/ℓ	3	3	1	0.005
	Zinc	mg/ℓ	5	5	2	0.046
	Dissolved iron	mg/ℓ	10	10	2	0.04
	Dissolved manganese	mg/ℓ	10	10	0.5	0.013
	Total chromium	mg/ℓ	2	2	0.5	0.02
	Fluorine	mg/ℓ	15	15	6	4.3
	Coliform organisms	unit/mℓ	3,000	3,000	200	65
	Total nitrogen	mg/ℓ	120	120	90	44
	Total phosphorus	mg/ℓ	16	16	3	1.0

• Health parameters have no record of actual use.

PRTR totalization

(kg)

PRTR No.	Chemical	Handling quantity	Emission			Transportation		Consump-tion	Removal	Recycle
			To atmos-phere	To public service water	Under-ground/ fill-up	To sewage	Out of site			
16	2-Aminoethanol	282,420.50	197.70	0.00	0.00	0.00	10.40	0.00	13,918.06	268,294.34
63	Xylene	706.73	537.13	0.00	0.00	0.00	169.60	0.00	0.00	0.00
67	Cresol	1,100.04	0.02	0.00	0.00	0.00	1,100.02	0.00	0.00	0.00
101	2-Etoxiethyl acetate	11,297.35	4,107.05	0.00	0.00	0.00	7,190.30	0.00	0.00	0.00
224	1, 3, 5-Trimethyl benzene	3,327.22	2,528.66	0.00	0.00	0.00	798.56	0.00	0.00	0.00
266	Phenol	39,180.48	2,175.17	0.00	0.00	0.00	31,191.11	0.20	5,814.00	0.00
283	Hydrogen fluoride and its water-soluble salts	54,288.15	0.00	1485.35	0.00	0.00	24.00	0.00	20,058.50	32,718.57
346	Molybdenum and its compounds	569.73	0.00	0.00	0.00	0.00	551.30	18.43	0.00	0.00

Noise/vibration measurements

	Classification	Unit	Maximum permissible quantity		Fiscal year 2001 measured value (max.)
			Regulations (prefectural)	Sharp standard	
Noise	Morning	dB	60	55	50 and less
	Afternoon	dB	60	60	50 and less
	Evening	dB	60	55	50 and less
	Night	dB	50	50	50* and less
Vibration	Afternoon	dB	65	35	30 and less
	Night	dB	60	35	30 and less

*Influenced by noise from vehicular traffic

Malodorant substance measurements

• The following substances were all below detectable limits (essentially not detected): Ammonia, xylene

COD, nitrogen, phosphorus emission

	Unit	Fiscal year 2001 measured value
COD	t	7.13
Nitrogen	t	18.56
Phosphorus	t	0.85

Environmental History and Awards

History

Environmental Activities Over the Years in Japan

	Activities
1971	● Established the Environmental Technology Center
1979	● Established the First Synthetic Energy Committee
1987	● Established the CFC Regulation Countermeasure Committee
1991	● Appointed the Corporate Director for Environmental Management
	● Established the Environmental Activities Promotion Department
1992	● Enacted the SHARP Environmental Charter and Basic Environmental Conservation Guidelines
1993	● Established the First Environmental Strategy Conference
	● Announced the Voluntary Plan on Environment
	● Began registration of persons in charge of environmental conservation for overseas operations
1994	● Phased out ozone-depleting chemicals in the cleansing process of all operations
	● Phased out vinyl chloride in all packaging
	● Established the C-PA (Chemical Product Assessment) system
1995	● Revised the Product Assessment Guidelines
1996	● Started an all-company effort to create Green Products
1997	● Completed of ISO 14001 Certification acquisition at all Japanese production sites
	● Conducted a Global Environmental Conference
	● Established the Environmental Protection Group

	Activities
1998	● Began the Environmental "3G-1R Strategy"
	● Green Products Guidelines published
	● Sharp Green Seal system introduced
	● Green Mind Campaign started
1999	● Environmental Report published
	● Kansai Recycle Systems Corporation established
	● Trial introduction of the Environmental Accounting System
2000	● All Japanese sites introduce the Green Purchasing System
	● Introduced full-fledged "Environmental Accounting System"
	● Launched "Environmental Solutions" business
	● Established company-wide chemical substance management committee
	● Issued "Green Factory Guidelines"
2001	● Launched "Green Engineering" training
	● Started "Super Green Initiatives"
	● Acquisition of ISO 14001 Integrated Certificate at major bases of all domestic sales and service companies
2002	● Achieved zero discharge to landfill at all Japanese production sites
	● Established environmental compliance committee

Awards

Sites

	Sites and Awards
1995. 6	**Tenri LCD Group, Tenri, Japan** • IPA (isopropyl alcohol) recovery and refinement, Ministry of International Trade and Industry Prize, 21st Award for Excellent Environmental Equipment.
1995.10	**ALL SHARP** • 1995 US Environmental Protection Agency Stratospheric Ozone Protection Award
1995.12	**Sharp-Roxy Appliances Corporation (M) Sdn. Bhd. (SRAC), Selangor, Malaysia** • Malaysia Ozone Layer Protection Award
1996. 4	**Sharp Manufacturing Company of U.K. (SUKM), North Wales, U.K.** • UK Styrofoam Recycling Award
1997. 6	**Electronic Components Group, Shinjo, Japan** • 1997 Environmental Protection Distinguished Service Award for Global Warming Prevention from the Environmental Agency
1997. 6	**TFT LCD Group, Tenri and Mie, Japan** • DMSO (dimethyl sulpho oxide) Contaminated Waste Water Recovery and Reuse System, Ministry of International Trade and Industry Prize, 23rd Award for Excellent Environmental Equipment.
1997.10	**Fukuyama IC Group, Fukuyama, Japan** • Recycling Promotion Achievement Award, Chairman's Prize from Recycling Promotion Association
1997.12	**Sharp Electronics Taiwan (SET), Kaohsiung, Taiwan** • 1998 Industrial Waste Recycling Activity Grand Prize from the Economy Management Bureau
1998. 1	**Sharp Thebnakorn Manufacturing (Thailand) (STTM), Nakornchaisri, Thailand** • 1997 Excellent Environmental All Factory Award
1998.10	**TFT LCD Group, Tenri, Japan** • Recycling Promotion Achievement Award, Chairman's Prize from Recycling Promotion Association
1999.10	**Integrated Circuits Group, Fukuyama, Japan** • Recycling Promotion Achievement Award, Ministry of International Trade and Industry Prize, from Recycling Promotion Association
1999.10	**TFT LCD Group, Mie, Japan** • Recycling Promotion Achievement Award, Chairman's Prize from Recycling Promotion Association
1999.12	**Sharp Electronics (Taiwan) Co., Ltd. (SET), Taiwan** • Award for Environmentally Conscious Companies • Silver Award for Recycling Activities
2000. 2	**ALL SHARP** • Special Company Award for Energy Savings
2001. 4	**TFT LCD Group, Mie, Japan** • 3rd Japan Water Award, Promotion Prize
2001.10	**West Japan Logistics Center** • 2nd Railway Freight Promotion Awards

Products

	Products and Awards
1994. 2	**Fully Automatic Washer** • Commendation from the Director General of the Agency of National Resources and Energy in the 1993 Energy Conservation Vanguard 21
1996. 2	**Electric Refrigerator** • Commendation from the Chairman of the Energy Conservation Center in the 1995 Energy Conservation Vanguard 21
1997. 1	**Residential Photovoltaic Power System** • Commendation from the Director General of the Agency of National Resources and Energy in the 1996 Energy Conservation Vanguard 21
1997. 1	**Electric Carpet** • Commendation from the Chairman of the Energy Conservation Center in the 1996 Energy Conservation Vanguard 21
1997. 1	**Refrigerator** • Commendation from the Director General of the Agency of National Resources and Energy in the 1996 Energy Conservation Vanguard 21
1997.11	**Vacuum Insulation Technology** • 1997 US Environmental Protection Agency Stratospheric Ozone Protection Award
1998. 1	**Fully Automatic Washer** • Commendation from the Minister of International Trade and Industry in the 1997 Energy Conservation Vanguard 21
1998. 2	**Residential Photovoltaic Power System** • Commendation from the Director General of the Agency of National Resources and Energy in the 1997 Energy Conservation Vanguard 21.
1999. 2	**LCD Navigation Microwave Oven / Super Mobile LCD / Low Energy Switching Power Device** • Commendation from the Chairman of the Energy Conservation Center in the 1998 Energy Conservation Awards.
1999. 2	**200 kW Photovoltaic Generator with Snow Melting Function** • Commendation from the Minister of International Trade and Industry in the 1998 New Energy Awards
1999. 2	**Residential Photovoltaic Power System** • Commendation from the Chairman of the New Energy Foundation in the 1998 New Energy Awards
2000. 1	**Refrigerator [made at Shanghai Sharp Electronics Co., Ltd. (SSEC)]** • Ozone Protection Award from China's Environmental Protection Agency
2000. 2	**20-inch LCD TV** • Commendation from the Chariman of the Energy Conservation Center in the 1999 Energy Conservation Awards
2000. 2	**Refrigerator** • Commendation from the Chairman of the Energy Conservation Center in the 1999 Energy Conservation Awards
2000. 2	**Environment-Friendly Housing Complexes Equipped with Photovoltaic Power Generation System** • Commendation from the minister of International Trade and Industry in the 1999 New Energy Awards
2000.11	**Non-volatile memory cell read-out circuit logic** • 2000 Kinki Regional Invention Prize
2001. 2	**Refrigerator/freezer** • Commendation from the Chairman of the Energy Conservation Center in the 2000 Energy Conservation Awards
2001. 2	**Residential Photovoltaic Power System** • Commendation from the Chairman of the New Energy Foundation in the 2000 New Energy Awards
2002. 2	**Apartment Equipped with High Density Photovoltaic Power System** • Commendation from the Minister of Economy, Trade and Industry in the 2001 New Energy Awards
2002. 2	**Residential Photovoltaic Power System for Hipped Roof** • Commendation from the Chairman of the New Energy Foundation in the 2001 New Energy Awards
2002. 2	**Micowave Oven** • Commendation from the Chairman of the Energy Conservation Center in the 2001 Energy Conservation Awards

Corporate Profile

Corporate Profile

Name	Sharp Corporation
Head office	22-22, Nagaike-cho, Abeno-ku, Osaka 545-8522, Japan
President	Katsuhiko Machida
Establishment	1912
Domestic bases	36
Overseas bases	65 in 27 countries
Operations	Manufacture and sales of audio-visual and communication equipment, home appliances, information equipment, electronic components, etc.
Employees	46,518* (30,010 in Japan, 16,508 in rest of world) *As of March 31, 2002, for Sharp Corporation and consolidated subsidiaries
Capital stock	205 billion yen* (rounded to nearest 1 billion yen) *As of March 31, 2002

Main Businesses

Products

Audio-Visual and Communi-cation Equipment	LCD TVs, LCD projectors, PDPs, CRT color TVs, HDTVs, TV/VCR combos, digital broadcast receivers, DVD players, ViewCams, VCRs, digital still cameras, 1-Bit digital audio systems, portable MD players, MD/CD radio cassette players, MD/CD stereo component systems, personal mobile tools, facsimiles, mobile phones, PHS phones, cordless phones, electronic dictionaries, electronic calculators
Home Appliances	Refrigerators, microwave ovens, air conditioners, washing machines, drum-type washing machines, vacuum cleaners, kerosene heaters, electric heaters, CCD cameras, home network control units, air purifiers, dehumidifiers, small cooking appliances
Information Equipment	Personal computers, POS systems, handy data terminals, electronic cash registers, workstations, LCD monitors, PC software, digital copier/printers, electrostatic copiers, PC peripherals including color inkjet printers and color scanners, supplies for copier/printers, copiers and printers

Electronic Components

ICs	Flash memory, combination memory, CCD/CMOS imagers, ICs for LCD, analog ICs, microcomputers
LCDs	TFT LCD modules, system LCD modules, duty LCD modules, EL display modules
Other Electronic Components	Electronic tuners, RF/infrared communication units, components for satellite broadcasting, laser diodes, hologram lasers, MD pickups. DVD pickups, optoelectronics, regulators, switching power supplies, solar cells, LEDs

Ensuring the Reliability of Sharp's 2002 Environmental Report

Third-Party Certification

Sharp considers third-party certification of environmental reports to be extremely important in gaining the trust of the reader. This certification process is intended to provide a comprehensive guarantee of the credibility of the contents of the report, ensuring that all necessary items are contained in the report, that there are no errors in the content, that numeric results were correctly calculated using appropriate methodologies, and the like. However, we did not seek third-party certification of this Environmental Report because we could not judge the methods currently implemented to be the most appropriate for meeting the goals and objectives of certification.
In the future, we believe that the means to ensure the objectivity, impartiality, and comparability of the certification process will be in place, including publishing coherent guidelines for qualification requirements for third-party certification examiners, auditing standards and auditing methodologies. We will monitor developments in this area, and will conduct frequent reviews regarding when it would be appropriate to introduce certification, and to whom to make the request for the audit.

Third-Party Opinion

The performance figures published in this report were compiled based on information provided by the various departments involved. For some time, we have been working to improve their reliability through mutual communications, such as giving serious weight to the opinions and views received through questionnaires and via the Internet to improve upcoming editions of our Environmental Reports.
In addition to these efforts, we have worked to improve the reliability the report content by inviting Mr. Kazutaka Murakami of the Kansai ISO Senior Consultant Network to participate in planning for its compilation and design of the publication. In addition to providing expert assistance in developing environmental audits and environmental systems, Mr. Murakami has also furnished overall guidance and pointed out deficiencies and areas that need improvement in last year's Environmental Report. We have also asked Mr. Murakami to give us a "third-party opinion" regarding the improvements made in the content of the finished report as a whole (see below).
In the future, we will be working hard to strengthen communications channels between ourselves and our readers in a committed effort to improve the report's credibility and reliability.

Third-Party Opinion With Respect to Sharp's Environmental Report

This report represents an accurate description of the high level of environmental protection activities that the company as a whole is engaged in, based on ISO 14001 standards. In an industry like manufacturing where the burden placed on the environmental is high, it can be clearly understood that the company is aggressively engaged in environmental management activities encompassing all aspects of its business—from product development to recycling. The content is entirely appropriate for an Environmental Report, including 1) general, standardized report items; 2) clarification of executive management's positions, policies and objectives related to environmental protection; 3) accurate descriptions of their activities and efforts in this area, 4) disclosure of past performance data, and 5) creation of a comprehensive, easy-to-understand report. The items covered in the report are descriptions of added measures taken to ensure regulatory compliance. In addition, the order of sections in the report and the graphs and charts have been improved so as to be significantly more reader-friendly. Social and economic-impact reports have also been added, and the strong intention to disclose more detailed information is quite apparent. Through disclosure in future environmental reports, we can look forward to the success of Sharp's ongoing corporate efforts to give careful consideration to the environment.

Kazutaka Murakami
Representative
Kansai ISO Senior Consultant Network

Professional background of Mr. Kazutaka Murakami

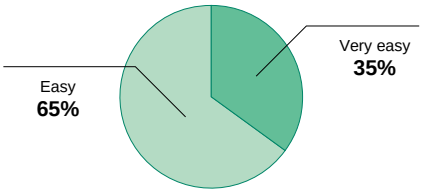
• 1962 ~ 1968 Tokyo Institute of Technology; completed Master's program in Industrial Engineering • 1968 ~ 1978 Matsushita Electric Industrial Co., Ltd.; acquired management skills in the field of electronic components • 1978 ~ 1981 Angel Co., Ltd.; held overall responsibility for development, manufacturing and quality control • 1982 ~ 1996 Rohm Co., Ltd.; production control manager for thermal heads and chief of environmental management • 1997 ~ 1998 A management consulting company; conducted ISO consulting and cost reduction consulting based on technology management • 1998 ~ present Became an independent ISO and management innovation consultant (in a business-oriented private consultant network)

Replies to Sharp Environmental Report 2001 Questionnaire

Every year, Sharp asks readers for opinions on its Environmental Report. Many readers responded with a wide range of valuable information in last year's Environmental Report survey. We thank those participants for their cooperation as we present the results of the 2001 survey and our subsequent improvements in response to reader comments.

Note:
The survey statistics represent only those responses received by fax.

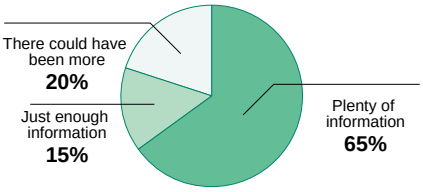
Q1 How easy to understand was the Environmental Report?



◆Opinions and improvements in fiscal year 2002

• The Environmental Report is not just a report; it's a source of knowledge.
⇒This year we did a feature on Sharp's environmental technologies.
• Easy to understand for people who are not environment experts. On the other hand, it is too simple for experts.
⇒We've tried to give as much data as possible by supplying sufficient site information.

Q2 How did you feel about the amount of information in this Environmental Report?



◆Opinions and improvements in fiscal year 2002

• All the necessary items are included.
⇒We tried to include even more social and economic reports, as well as information from various sites.
• There's plenty of information, with the report divided into 6 environmental activity stages.
• It's good that activities in Asian bases were included.
⇒This year as well, we've included lots of case studies from international bases.
• There's not enough data from the standpoint of an LCA. Also, I want to know the level of understanding individual employees have in their environmental activities.
⇒We understand that employees' environmental knowledge and thinking are very important. In future, we plan to boost environmental education and introduce what employees are doing in the Environmental Report. This year's Environmental Report includes information on how employees are working to decrease the burden on the environment.

Q3 What information about Sharp did you find most impressive in this Environmental Report?

Long vision…5 persons
Cover story…6
Main objectives and level of achievement…4
Management…6
Products (Green Products)…7
Factories (Green Factories)…4
Recycling (Recycling Business)…4
Awareness (Green Mind)…6
Sites data…2

◆Opinions

• The features were entertaining and showed how Sharp is a unique company.
• The features were very interesting.
• I could see exactly what Sharp is doing to make environmentally friendly products.

Q4 Please add any thoughts or opinions you have on this Environmental Report or on Sharp's environmental activities.

◆Opinion and improvement

• Sharp should take into consideration the opinions of third parties (general public, other industries, NGOs), even if they are not certified
⇒The 2002 Environmental Report included comments by environmental consultant Mr. Murakami.

Q5 What do you hope to see Sharp do in future as far as the environment is concerned?

◆Opinions

• I hope to see Sharp, an environmental leader, make energy-efficient, environmentally conscious products that contribute directly to the environment.
• I want Sharp to be an industry leader by pursuing its 3R policy.

Editorial Policy for Environmental Reports

① We have given priority to articulating Sharp's corporate attitude and aim for achieving a "sustainable society." We have also presented material emphasizing the interlinked environmental, social and economic aspects of Sharp's business activities within the framework of the Sustainability Reporting Guidelines advocated by the Global Reporting Initiative (GRI).
② We have presented material encompassing the full range of our activities, including negative information, referring to the Ministry of the Environment's Environmental Report Guidelines (Fiscal 2002 Edition) and Environmental Performance Indicators for Business (Fiscal 2002 Edition), and the GRI's Sustainability Reporting Guidelines.
③ We have emphasized conveying information in an easily comprehensible form, targeting not only environmental experts, but also users of our products, people who live in the vicinity of our business locations, suppliers, vendors, business partners, students, and other broad segments of the community, and have aimed at using a straightforward writing style and incorporating numerous illustrations and photographs. We have also given serious attention to the feedback received from questionnaires accompanying our 2001 Environmental Report, and have worked to improve its content based on this information.
④ We will redouble our efforts in the future, and move aggressively to disclose additional information to achieve further improvement in this report.

About the Cover Design

The cover design for this report was chosen from contest submissions received from employees of the Sharp Group in Japan and abroad, and from their families. From among the 156 entries received, we selected the work of Ms. Kaoru Hokazono, Junior Manager, Appliance Systems Group Design Center to use as the cover design.

For any inquiries on this report please contact:

Environmental Strategy Planning, Environmental Protection Group,
SHARP CORPORATION, JAPAN
4-3-41, Kami-minami, Hirano-ku, Osaka 547-0003, Japan
Phone: +81-6-6792-5500 Fax: +81-6-6792-0012
E-mail: eco@sharp.co.jp

ENVIRONMENTAL REPORT 2002

SHARP

SHARP CORPORATION, JAPAN
22-22, Nagaike-cho, Abeno-ku,
Osaka 545-8522, Japan
Phone: +81-6-6621-1221
http://www.sharp.co.jp

PRINTED WITH SOY INK

Printed on 100% post-consumer recycled paper using 100% soy bean ink

Published: November 2002
Printed in Japan