

ENVIRONMENTAL  
REPORT  
2001



**SHARP**

2001

**ENVIRONMENTAL  
REPORT**

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## About this Report

This report contains information about the environmental activities of Sharp Corporation and its affiliated companies during fiscal year 2000 (April 2000~March 2001) and also introduces some policies and objectives for fiscal year 2001 and beyond.

[Companies 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: 24

Non-affiliated production sites (domestic and overseas)

## Message from the President

Mass production, mass consumption and massive waste characterized much of 20th century human society. In the 21st century, we must assume responsibility for solving the many issues concerning the impact of our behavior on the natural environment, in order to preserve our irreplaceable Earth for centuries to come. To this end, we need to review existing social systems and provide radical solutions to environmental issues, thereby building a truly sustainable society.

At Sharp, we established our corporate creed of “Creating an Environmentally Conscious Company with Sincerity and Creativity” in 1992, and have remained committed to the ideals of environmental preservation ever since. Now, at the beginning of the 21st century, we must continue to implement policies that integrate sound corporate management with encouragement for the preservation of the environment. This approach demands that all our business activities be “green.”

We intend to devote our energies to the development of environmentally conscious “green products,” and to contribute to a sustainable society—one of our primary missions as a manufacturer. In concrete terms, this means promoting the development of feature-packed products focused around such “green” solutions as photovoltaic systems, which convert sunlight into energy, and energy- and resource-saving LCDs.

In this, the third issue of this environmental report, we are making public all currently available information concerning the results of Sharp’s environmental activities and our future guidelines for environmental preservation.

We sincerely hope that you share our heartfelt concern about these issues, and welcome our communication of this important material. Environmental preservation is, by its nature, a cooperative endeavor. On our part, we will make every effort to ensure that this forum helps to progress Sharp’s environmental activities, and we welcome advice and suggestions from any and all of you.



**Katsuhiko Machida**  
President  
Sharp Corporation





## Sharp Environmental Promotion

At Sharp, we believe that society can achieve sustainability by introducing new technologies and social systems to transcend conventional practices. It is important for companies such as ours to improve resource and environmental efficiency. We must harness cutting-edge technologies to develop more environmentally conscious products, and produce these products in ways that have less impact on the Earth.

We also need to take vigorous part in education for all members of society and provide open information to the public in order to extend and deepen our communication with consumers. Environmental management is of great importance, and Sharp will carry out such promotional activities as a means to contribute to the realization of a sustainable society.

Sharp's business activities include a strong focus on environmental preservation in the development of environmentally conscious products, as well as in the areas of waste reduction, energy saving, and the reduction and control of chemical materials.

As a guideline for our efforts to resolve these issues, Sharp launched its "3G-1R Strategy" in 1997, comprising the four action themes outlined below. This has shown successful results in reducing energy consumption and waste, as well as in the development of original "Sharp Green Seal" environmentally friendly goods.

<b>3G-1R</b>	 GP: Green Products	Develop environmentally conscious products; products that minimize resource and energy use.
	 GF: Green Factories	Manufacture with the environment in mind. Reduce the use of energy and chemicals in manufacturing and the generation of waste products. Create environmental management systems.
	 GM: Green Minds	Create an ecologically minded company atmosphere. Raise awareness among employees and their families. Promote environmental education. Make social contributions.
	 RB: Recycling Business	Collect and recycle used products where feasible. Create a system for collecting and recycling used products in Japan and support efforts throughout the world to address the issue of end-of-life electronic products.

In fiscal year 2001, we will initiate "Super Green Initiatives," based on the "3G-1R Strategy" above, to make all of our business activities "green." This is a company-wide promotion intended to upgrade environmental management of our activities by categorizing them into six distinct phases—management, planning/design, production, recycling, mind-set and logistics—for improved organization, integration and effectiveness. It will also help to ensure that our objectives and countermeasures are clearly defined and fully understood.

We will step up this campaign as one of our mid-term objectives, thus acting to contribute to the realization of a sustainable society.

**Shintaro Hashimoto**

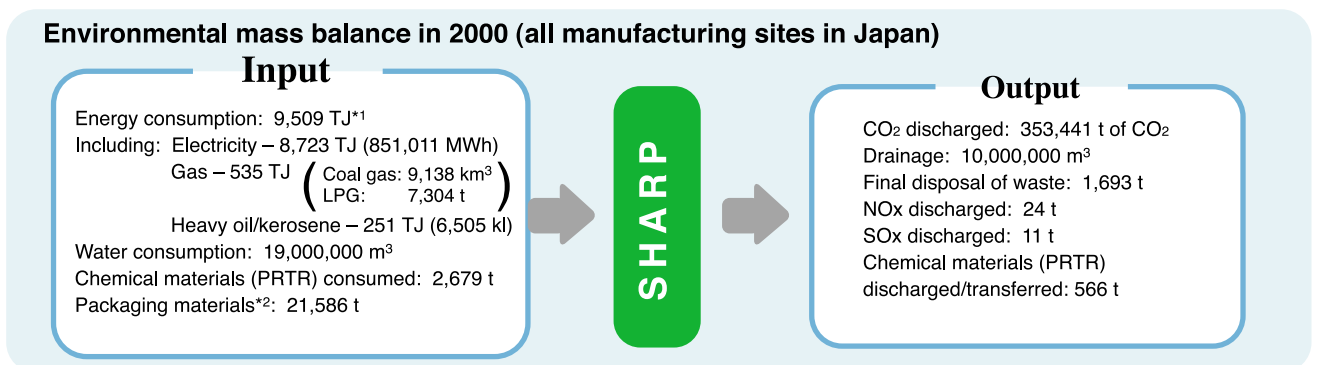
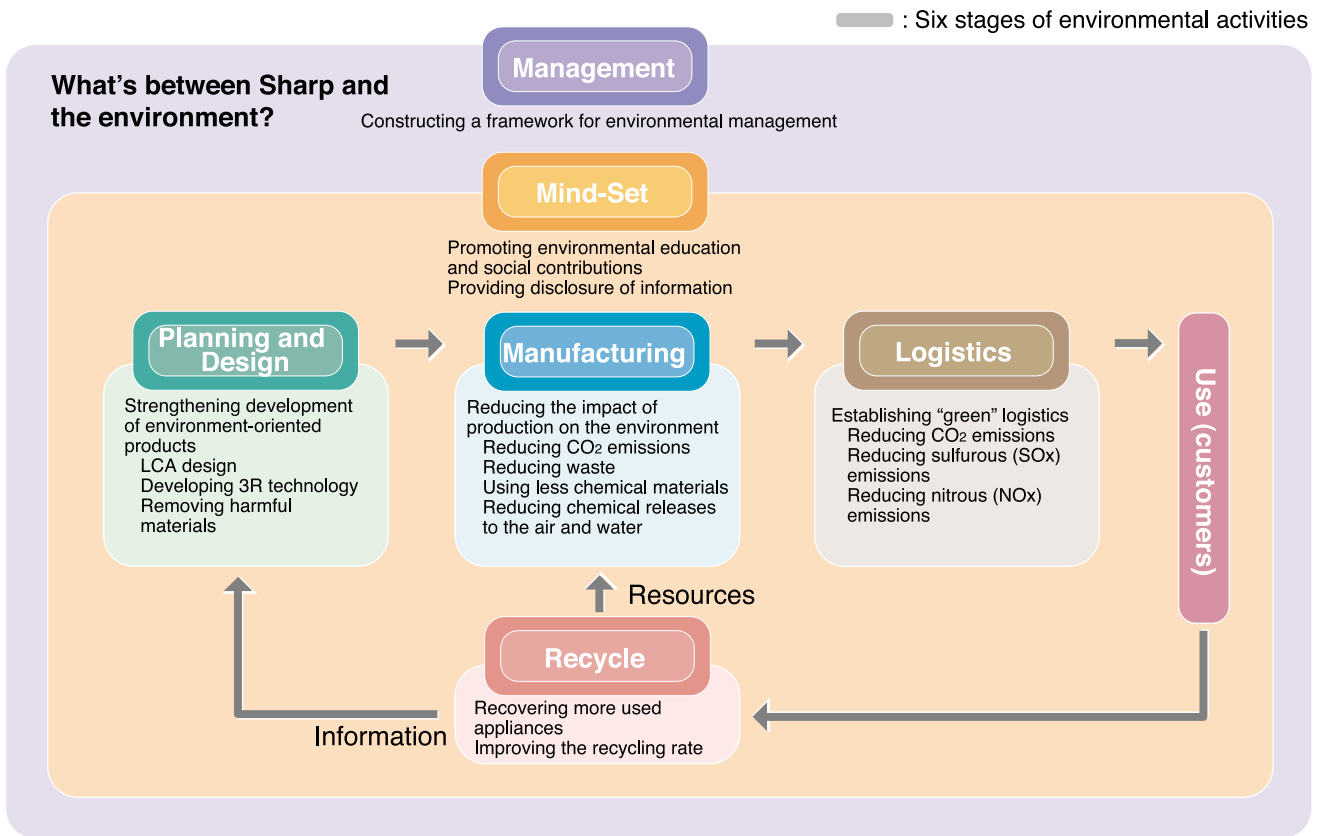
Corporate Director,  
Environmental Management and  
Group General Manager,  
Environmental Protection Group



# Realization of a Sustainable Society

For a company such as ours, the first step in contributing to a sustainable society is to understand the environmental effects caused by our business activities numerically. Sharp has decided to use as a guideline the Entrepreneurs' Environmental Performance Indexes (2000 version), issued by the Japan Ministry of the Environment in February 2001. We implemented this measure because we believed that Sharp itself, as well as all those with a stake in the company—employees, shareholders, clients and other interested persons—could evaluate the status of the company's environmental performance more accurately by viewing it in its totality, based on a common framework. In fiscal year 2000, we also began considering actual environmental performance for a Division Business Performance Evaluating System. To ensure the success of this program, we found it important to establish a system to measure our performance against our objectives.

All of our action themes—the 3G-1R Strategy, the Super Green Initiatives, the numerical assessment of environmental performance and the Division Business Performance Evaluating System—are designed to support and further our environmental goals. Pursuing all these initiatives concurrently, we intend to establish a consolidated system of sound environmental management and contribute to the realization of a sustainable society.



\*1) TJ = 10<sup>12</sup> joules

\*2) Includes cardboard, polystyrene foam, plastics and wood

# Creating and Saving Energy to Ensure a Sustainable Future

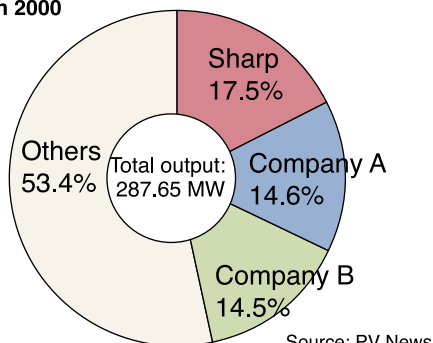
*In order to contribute to a sustainable society as a manufacturer of electronic equipment, Sharp is committed to developing energy-generating and energy-saving products company-wide. In fiscal year 2000, the total production in Japan of Sharp's Environmentally conscious products will contribute to energy saving of approximately 2087 GWh during the products' lifetimes. (For details, see page 13.) This figure corresponds to approximately 2.5 times the total power consumed by all Sharp production sites in Japan during 2000, or the power generated by the No. 1 Plant of the Mihama Nuclear Power Station during fiscal year 1999.*

## Sharp Produced Photovoltaic Cells Totaling 50,400 kW in 2000

Sharp's 17.5% share of the total world photovoltaic cells shipment in the year 2000 gave us the largest share of this global market\*1. Over the course of that year, the photovoltaic cells that Sharp produced generated 54,700 MWh of electrical power. Compared to the generation of equivalent power by petroleum-fired thermoelectric power plants, this represents the elimination of 36,102 tons of CO<sub>2</sub>\*2 that would otherwise have been discharged into the atmosphere.

Sharp's residential photovoltaic power generation system received the "New Energy Award" in the New Energy Equipment/System category in Japan in 2000,

World photovoltaic cell shipment and market share in 2000



marking its fifth consecutive year for this award. This system was highly rated for its high-efficiency photovoltaic module, which features an increased sunlight-to-energy conversion efficiency of 16%, and a multi-power conditioner that allows for greater freedom in panel arrangement to enable the installation of more photovoltaic systems in a limited space. With the combination of these features, it can supply a larger volume of electric power, thereby accelerating the spread of residential photovoltaic power generation systems in Japan.

\*1) Source: PV News

\*2) Source: Report on the Results of 1996 NEDO Commissioned Business Operation, "Survey and Research on Photovoltaic Power Generation Assessment." Amount of CO<sub>2</sub> generated: calculated in terms of 200 g - C/kWh (733 g - CO<sub>2</sub>/kWh) by petroleum thermoelectric power generation and 20 g - C/kWh (73.3 g - CO<sub>2</sub>/kWh) by crystalline silicon photovoltaic system power generation

The Sharp NE-K136A photovoltaic module and JH40EK multi-power conditioner





## Contributor to Sustainable Energy Production

In line with our desire to contribute to the realization of a sustainable society, Sharp intends to develop a broader range of environmentally conscious products. Photovoltaic systems, in particular, are a key device for creating energy from sustainable resources to meet future energy demand.

### 1. Helping to prevent global warming

A residential-use 3 kW-capacity photovoltaic power generation system produces approximately 3,000 kWh of electric power per year. This means the system effectively eliminates the production of 1,980 kg of CO<sub>2</sub> a year.

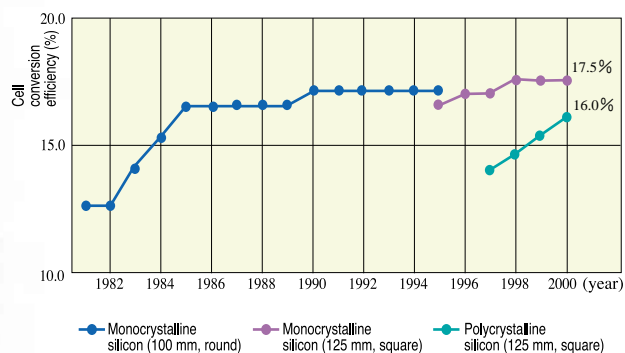
### 2. Saving fossil fuel

Meeting household electricity demand with a primary or supplemental photovoltaic power generation system helps reduce fossil fuel consumption due to thermoelectric power generation. This means that popularizing photovoltaic power generation can save fossil fuel.

### 3. Using solar energy effectively

It has been said that the sun is capable of producing 1 kW of energy per 1 m<sup>2</sup> per hour. Electric power can be obtained from this solar energy by using a photovoltaic power generation system. If the system has an overall conversion efficiency of 10%, for example, we can gain 0.1 kWh of electric power per hour.

#### Improvement in photovoltaic cell conversion efficiency



Sharp first marketed residential-use photovoltaic power generation systems in 1994. Our current residential-use photovoltaic modules feature an enhanced cell conversion efficiency of 17.5% for monocrystalline cells and 16.0% for the polycrystalline type. In order to make the most effective use of this natural resource, the inexhaustible energy of the sun, we are endeavoring to further enhance conversion efficiency.



Nippon Institute of Technology

Sharp Amenity Systems Co., Ltd., Nippon Institute of Technology and Space Concept Inc. jointly received the "Chairman's Prize of New Energy Foundation" in the category of New Energy Application Category.

## “Witness the LCD Century!” Sharp Replaces All Televisions with LCD TVs

Sharp believes that LCDs are energy-saving, resource-saving displays that can help to preserve the earth’s environment.

As stipulated in the Japan “Law on Promoting Green Purchasing,”\*4 LCD screens are one of the criteria for evaluating TVs as environmentally conscious products. Thus, the environmental benefit of LCD TVs is acknowledged by law.

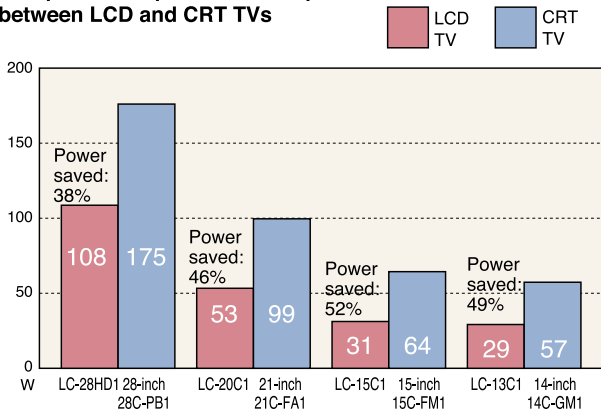
LCD TVs have a lower environmental impact than conventional televisions in ways beyond their energy-saving features; for example, new models use only lead-free solder.

\*4) The “Law on promoting Green Purchasing” (officially: Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities) has been in effect in Japan since April 2001.

### (1) Energy-saving effects

An LCD TV saves approximately 38% of the power consumed by a conventional 28-inch CRT television.

Comparison of power consumption  
between LCD and CRT TVs



### (2) Saving space and resources

Thinness and weight reduction are two of the outstanding features of LCDs. When compared with a 21-inch CRT television, an LCD TV weighs one-fourth or less and is only about one-eighth as deep. This reduction in product size and weight also results in a reduction in parts and material consumption. (For details, see page 18)

## Sharp Consistently Strives to Design Products that Save Energy

Together, air conditioners, refrigerators and television sets account for approximately 50%\*5 of the total electric power consumed in a Japanese home each year. Thus, these three products can exert a great influence on energy savings in the home. Since 1995, Sharp has cut annual power consumption by 27% for air conditioners, 40% for refrigerators and 27% for TVs. In addition to these home appliances, we are committed to the promotion of energy-saving goals with regard to copiers, facsimiles and other electronic business machines.

Source: Agency of Natural Resources and Energy of Japan.  
Outline of electricity supply and demand in fiscal year 1998  
(based on estimates of fiscal year 1997 results)

Comparison of power consumption of major appliances  
in Japan

Item	1995	2000
Air conditioner (2.8 kW type)	1,365 kWh	991 kWh
Refrigerator (400-liter type)	566 kWh	340 kWh
Television (28" model with built-in BS tuner)	205 kWh	149 kWh

### Environmental benefits of LCD TVs

Lead-free soldered PWB  
(As of July 2001)



Pulp-mold packaging  
(no polystyrene foam used)



Non-halogen cabinet used

Chrome-free steel used  
(as backlight frame)

Lead-free power cord

#### Energy-saving design

**LC-15C1**  
Power consumption  
in standby:  
0.17 W ⇒ 0.10 W  
in operation:  
33 W ⇒ 31 W  
(compared  
with previous  
model)



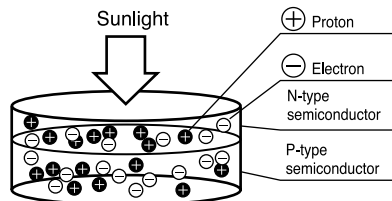
Recycled plastic used in stand



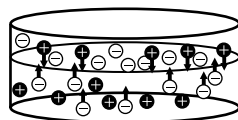
## Basic theory of photovoltaic cells

Photovoltaic cells are made of silicon or other semiconductive materials that are also used in LSIs and transistors for electronic equipment. Photovoltaic cells use two types of semiconductors—P-type and N-type—to generate electricity.

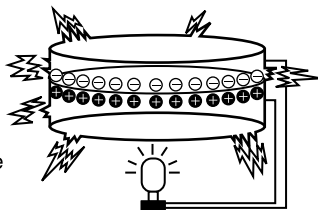
1. When sunlight strikes a semiconductor, it generates pairs of electrons (-) and protons (+).



2. When an electron (-) and a proton (+) reach the joint surface between the two types of semiconductors, the former is attracted to the N-type and the latter to the P-type semiconductor. Since this joint surface supports only one-way traffic, they are not able to rejoin once they are drawn apart and separated.



3. Since the N-type semiconductor now contains an electron (-), and the P-type semiconductor contains a proton (+), an electromotive force (voltage) is generated. Connect both electrodes with conductors, and the electron (-) runs from the N-type to the P-type semiconductor, and the proton (+) from the P-type to the N-type semiconductor to make an electric current.



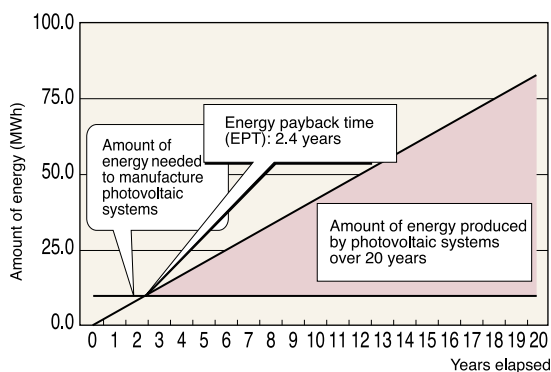
## Energy balance in photovoltaic power generation systems

When the energy required to make a photovoltaic power generation system is less than the power it generates through photovoltaic conversion, the system can be said the Energy Breeder.

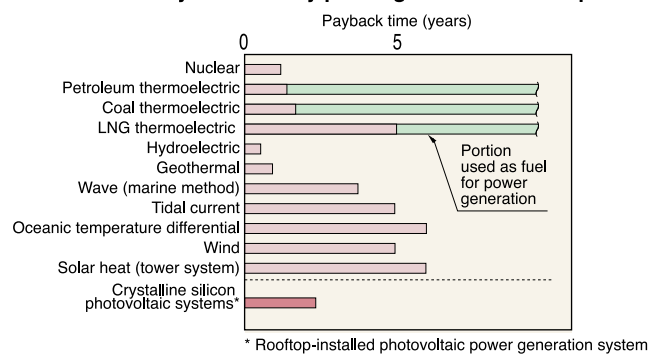
The time required by the photovoltaic power generation system to generate the same amount of energy as that used for manufacturing the system is called the “energy payback time.” Payback time is 2.4 years\* with the polycrystalline silicon photovoltaic power generation system. Supposing that the average service life is 20 years or so, the polycrystalline silicon photovoltaic power generation system will produce new energy for 17.6 years. Even when compared with other natural-energy power generation techniques, such as hydroelectric and geothermal power generation, it is apparent that photovoltaic systems have a shorter energy payback time.

\* Source: Report on the Results of 1996 NEDO Commissioned Business Operation, “Survey and Research on Photovoltaic Power Generation Assessment”

### Energy balance and payback time for photovoltaic power generation systems



## Payback time by power generation technique

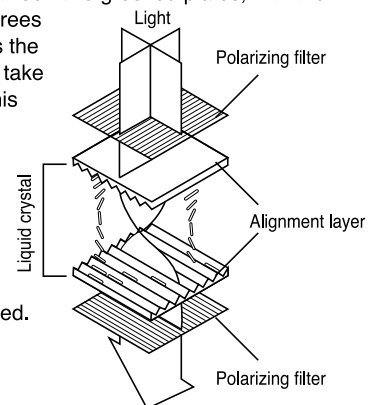


## Mechanism of liquid crystal displays

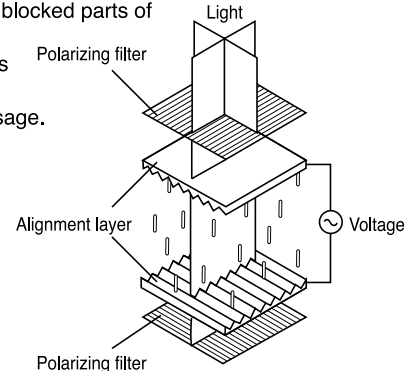
Liquid crystals are materials that have an intermediary property; they exist in a state between that of a liquid and a solid, like cuttlefish ink, for example. In a natural state, liquid crystals always line up in a longitudinal direction. When they are arranged so that they are in contact with a plate with grooves cut in a fixed direction, the crystals begin to line up along the grooves. Liquid crystal materials also have a characteristic of changing their molecular arrangement when electrified.

A display device can be made by combining liquid crystal material and a polarizing filter, which only allows beams of light to pass through in a specific direction.

1. In TN (twisted nematic) liquid crystal displays, the liquid crystal material is sandwiched between two grooved plates, with their grooves aligned at 90 degrees to each other. This causes the liquid crystal molecules to take on a 90-degree twist. At this point in time, light travels along the space between the lines of molecules. Since the polarizing filter faces are twisted by 90 degrees, light passes through just as when the blades of a blind are opened.



2. When voltage is applied, the molecules begin lining up in a different way.
3. Since light travels straight without being twisted, the polarizing filter works like the closed blades of a blind to block the light, thereby darkening the blocked parts of the screen. Applying voltage selectively thus either allows light to pass or blocks its passage.

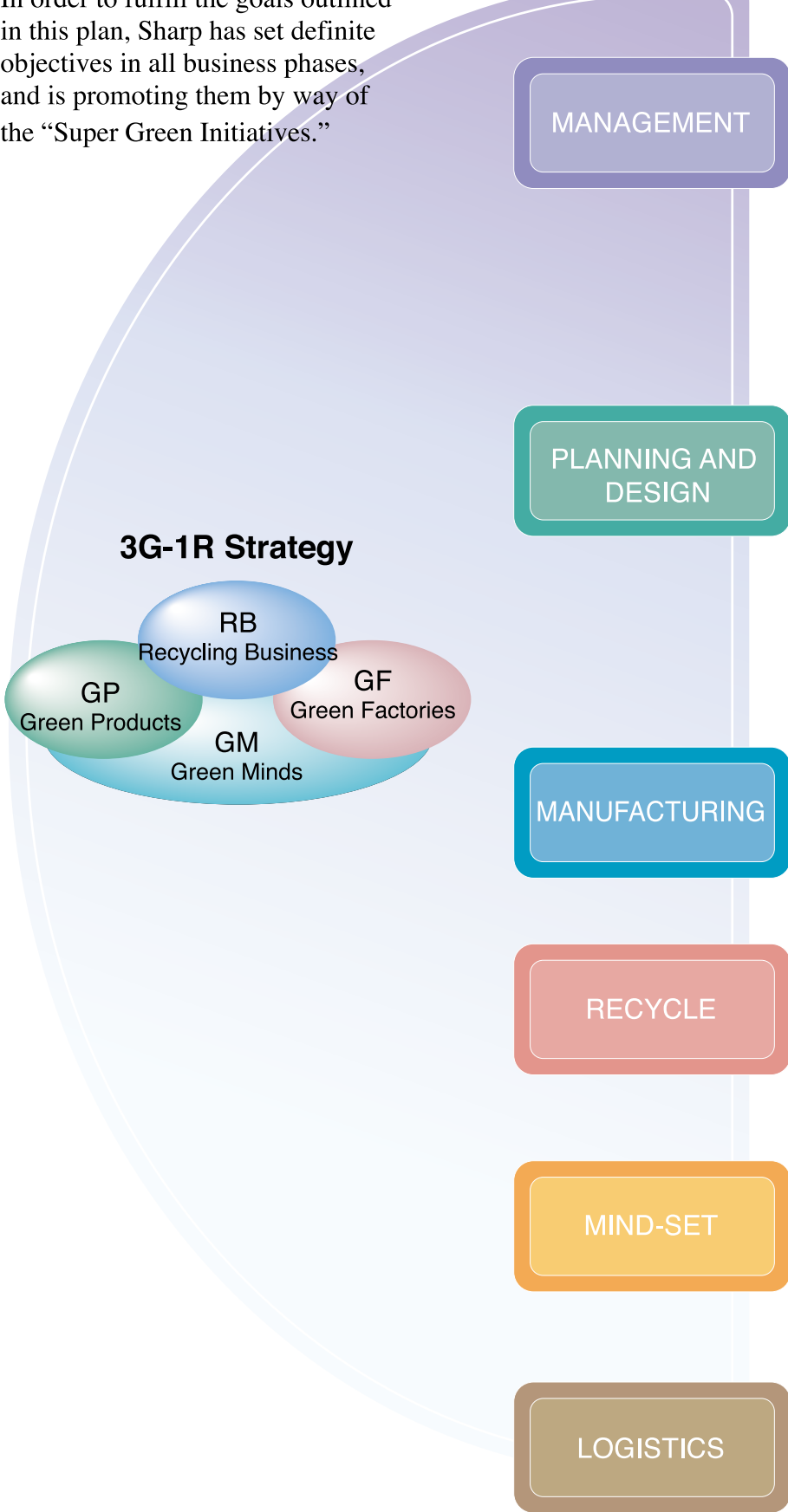


4. An array of these mechanisms makes it possible to display the shapes of various graphics and letters.
5. Liquid crystal displays are made by arranging sets of the illustrated mechanisms into an integrated display module.

# Main Objectives and Level of Achie

Sharp has established the “3G-1R Strategy” as a template for corporate environmental activities. In order to fulfill the goals outlined in this plan, Sharp has set definite objectives in all business phases, and is promoting them by way of the “Super Green Initiatives.”

**Super Green Initiatives**  
Taking action to realize the 3G-1R strategy in all phases of our business activities.



Promotional Themes
Improving environmental management company-wide
Constructing an organization for environmental management
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
Reduce the amount of packaging materials
Establishing green factories
Preventing global warming
Reduction of waste
Controlling chemical substances
Establishing recycling plants for home appliances
Recycling OA equipment
Environmental education
Social contributions
Promoting information disclosure and environmental communication
Cutting CO2 generated by physical distribution

# vement in Fiscal Year 2000

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

	Objectives	Mid-Term Objectives (year when achieved)	Objectives for Fiscal 2000	Achievement in Fiscal 2000	Self Evaluation	See Page	
	Integrating the environmental management system	All domestic sales/service companies acquire overall ISO certification (2001)	Providing promotional organizations at all bases	100%	○	P. 12	MANAGEMENT STAGE
		All domestic production sites acquire overall ISO certification (2002)	—	—	—	P. 12	
	Adding environmental performance item to Division Business Performance Evaluating System	Introduction worldwide (2003)	Introduction domestically	100%	○	P. 12	PLANNING AND DESIGN STAGES
	Introducing environmental accounting	Introduction worldwide (2003)	Full domestic introduction	100%	○	P. 13	
	Executing green purchasing	Execution worldwide (2003)	Execution domestically	100%	○	P. 14	
	Conducting environmental impact assessments of goods based on LCA	Conducting general assessments (2003)	Conducting CO <sub>2</sub> assessments on major goods	100%	○	P. 16	MANUFACTURING STAGE
	Expanding the ratio of green-seal products	50% (2003)	25%	25.7%	◎	P. 17	
	Employing lead-free soldering for all products	Introduction worldwide (2003)	Execution for two items	100%	○	P. 19	
	Abolishing the use of halogen compounds for casings and cabinets	All goods (2003)	Major goods	100%	○	P. 19	RECYCLE STAGE
	Practical recycling of plastic materials	Practical recycling of mixed plastics (2003)	Developing a PP resin recycling technique	100%	○	P. 20	
	Cutting the total discharge of packaging materials	Cutting by 10% from 2000 levels (2003)	Cutting discharge of polystyrene foam by 50% from 1995 levels	39.4%	×	P. 21	
	Introducing green factory guidelines	Worldwide (2003)	Introduction domestically	100%	○	P. 22	MIND-SET STAGE
	Reduction of CO <sub>2</sub> emission per production unit	Cutting by 25% from 1990 levels (2010)	Cutting by 2% from the previous year's levels	Cut by 11.2%	◎	P. 23~24	
	Achieving zero discharge to landfill company-wide	Lowering the final disposal rate to less than 0.5% (2002)	Lowering final disposal rate to 2% or less	1.5%	◎	P.25~26	
	Controlling total discharge of materials	Cutting by 4% from fiscal year 1998 levels (2002)	Cutting by 2% from the previous year's levels	Increased by 52.7%	×	P.25~26	LOGISTICS STAGE
	Reduce of the discharge of toxic chemical substances	Cutting by 50% domestically (2003)	Introduction of a chemical material control system	100%	○	P. 28	
	Putting recycling plants into operation	—	Full operation	100%	○	P.29~30	
	Constructing an OA equipment recycling system	Home-use PCs (2002)	Business-use PCs and copiers	100%	○	P.31~32	LOGISTICS STAGE
	Holding environmental education and general and expert training at Sharp	1,500 general participants, 300 specialists (2003)*	2,270 general participants 1,460 specialists	1,650 general participants 1,439 specialists	×	P. 33	
	Carrying out environmental education for elementary and junior high school students	1,000 students (2001)	—	—	—		
	Community environmental activities Publishing environmental reports	All domestic and overseas production plants (2001)	All domestic production plants	100%	○	P. 34	LOGISTICS STAGE
	Publishing environmental reports	—	Published in Japanese and English	Published in Japanese, English and Chinese	◎	P. 35	
	Expanding JR container transports	Achieving an average of 330 transports per month (2003)	Average of 200 transports per month	Average of 165 transports per month	△	P. 36	

\* Target values changed in fiscal year 2001

# Environmentally Conscious Management

## I. Basic Environmental Policy and Organizational System

Sharp decided on the “Basic Environmental Philosophy” and “Basic Regulations for Preserving the Environment” in 1992 as the basic guidelines for activities directed toward the preservation of the Earth’s environment. In 1998, Sharp instituted “Sharp Business Standards and Action Guidelines,” and has since continued to undertake practical promotions, based upon these guidelines.

### 1. Sharp Basic Environmental Philosophy

Creating an Environmentally Conscious Company with Sincerity and Creativity.

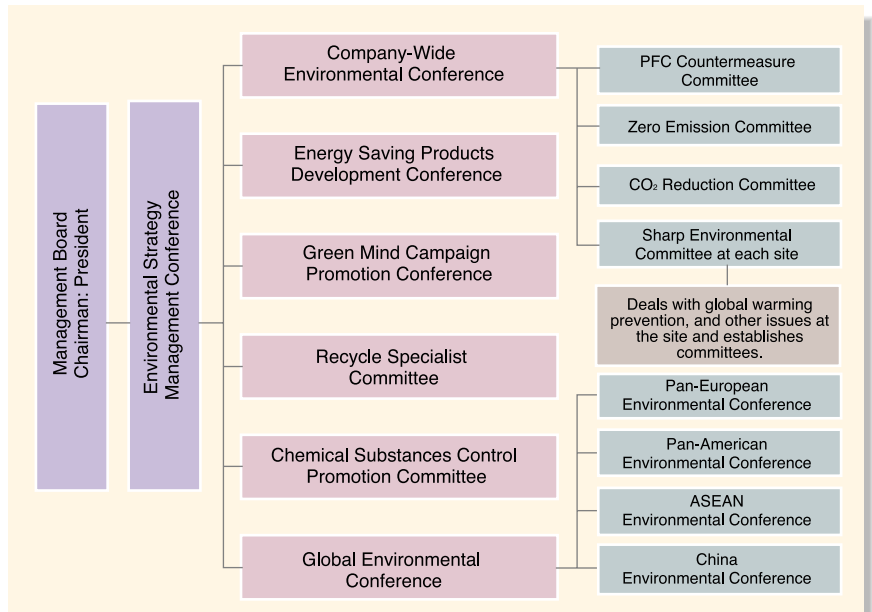
### 2. Sharp Business Standards and Action Guidelines (Concerning Environmental Issues)

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) <ul style="list-style-type: none"> <li>● 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.</li> <li>● Proper management of chemicals used in research and manufacturing will be conducted in accordance with regulations or standards that surpass regulatory requirements.</li> <li>● An international perspective will be adopted by receiving and reporting information while promoting communication with the public on environmental issues.</li> </ul>
Introduce ISO environmental management systems in all worldwide manufacturing bases.	(Implementation of the ISO 14001 environmental management systems) <ul style="list-style-type: none"> <li>● 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.</li> <li>● Certification for additional ISO Standards (for example the LCA [Life Cycle Assessment]) will be actively introduced and certification pursued.</li> </ul>
By promoting environmentally oriented business activities, we will contribute to building a society in which resources are recycled.	(Development of environmentally conscious products) <ul style="list-style-type: none"> <li>● Energy-efficient designs will be used as an integral part of continuing the development of smaller products that use the least amount of resources.</li> <li>● Our products should not contain materials that destroy the environment and waste natural resources or contain toxic substances that are harmful to human health.</li> <li>● 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.</li> </ul> (Environmentally conscious business activities) <ul style="list-style-type: none"> <li>● Strive to prevent global warming by introducing energy-efficient equipment.</li> <li>● 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.</li> <li>● 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.</li> </ul>

### 3. Sharp Corporation Company Organization for Environmental Protection

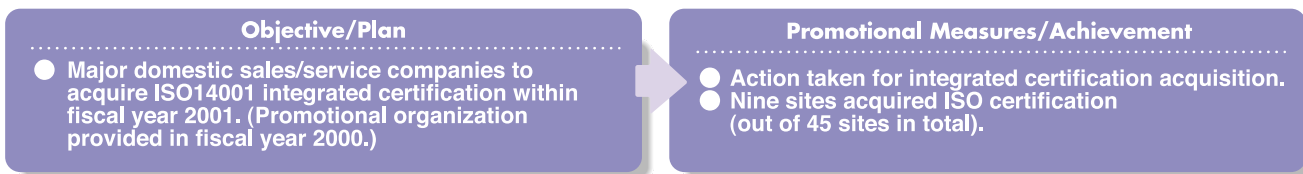
The director in charge of environmental affairs plans and develops company-wide strategies related to the preservation of the Earth’s environment. Environmental supervisors are stationed at Sharp’s headquarters and also at all production bases to develop measures for environmental preservation. Important affairs, including strategies, guidelines and objectives, are determined at environmental Strategy Management Conferences. In fiscal year 2000, Sharp established a new “Chemical Substances Management Committee” to consolidate the organization of this sector.

#### Company-wide environmental protection organization



## II. Application of Environmental Management

Sharp has acquired ISO 14001 certification for individual sites and has been involved in making continual improvements to lessen environmental impact. Looking toward the unification of corporate guidelines and activation of promotional initiatives, Sharp intends to acquire overall certification as well.



### 1. ISO 14001 and Environmental Auditing

Before the end of fiscal year 1997, all domestic production sites completed the acquisition of ISO 14001 certification. Currently, domestic sales/service companies are striving for integrated certification. In fiscal year 2000, Sharp stationed environmental supervisors and promoters at all bases and, within fiscal year 2001, Sharp expects to acquire integrated certification. Furthermore, Sharp is now preparing unified corporate environmental standards for integrated certification acquisition by all domestic production sites. In regard to inspections, Sharp has set up an organization of 450 internal environmental auditors. Sharp conducts both internal and third-party environmental audits at all sites every year, thus striving to make the most effective use of the environmental management system and steadily improve environmental performance.



Environmental auditing

#### List of sites and subsidiaries that acquired ISO 14001 certification in fiscal year 2000

Date of acquisition	Sites & subsidiaries	
	Name registered	Location
Apr. 2000	Kami Bldg.	Osaka, Japan
Apr. 2000	Syutoken No.1 Branch of Sharp Engineering Co., Ltd.	Tokyo, Japan
Apr. 2000	Kanto Tatsumi Electric Co., Ltd.	Tochigi, Japan
Apr. 2000	Sharp Electronics (U.K.) Ltd. (SUK)	Manchester, U.K.
May 2000	Sharp-Roxy Appliances Corporation (M) Sdn. Bhd. (SRAC)	Selangor, Malaysia
Aug. 2000	Sharp Hiroshige Mie Corporation	Mie, Japan
Sept. 2000	Sharp (Phils.) Corporation (SPC)	Manila, Philippine
Oct. 2000	P.T. Sharp Yasonta Indonesia (SYI)	Jakarta, Indonesia
Jan. 2001	Sharp Electronics Europe GmbH (SEEG)	Hamburg, Germany
Total	45 sites and subsidiaries	

### 2. Environmental Solutions Business

To offer Sharp know-how to a broad range of businesses, our specialists support the construction of environmental management systems. Sharp also holds general environmental seminars, along with training for internal environmental auditors and internal environmental lead auditors, for all our concerned clients and customers.



Environmental seminar

### 3. Observation of Laws and Regulations

Sharp strictly observes environmental laws and regulations, and received no notices of violations of these acts under such laws in Japan in fiscal year 2000.

#### Adding environmental performance items to our Division Business Performance Evaluating System

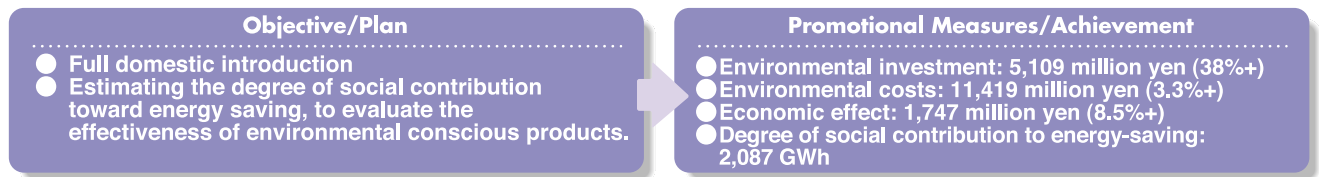
Sharp recognized the need for a system of evaluating business performance in promoting environmental management that solidly incorporates environmental activities into general business management. Beginning in the first half of fiscal year 2000, Sharp added certain items related to environmental activities to its business performance evaluation of domestic production business divisions. This has helped us dramatically in developing our environmental activities, which received a tremendous response from the industrialized world and garnered praise as advanced initiatives for environmental preservation.

#### Evaluation items related to environmental activities

- Green product achievement rate
- CO2 reduction rate
- Zero emission achievement rate

### III. Environmental Accounting System

As a tool for quantitative assessment of environmental preservation initiatives, Sharp introduced guidelines specified by the Japanese Environment Agency in 1999. Here, we describe our primary objectives and illustrate Sharp's improvements in fiscal year 2000 through quantitative comparisons with the previous year.



#### 1. Summary of Achievements in Fiscal Year 2000<sup>\*1</sup>

Environmental protection cost (millions of yen)					
Category		Investment <sup>*2</sup>	%	Expenses	%
Cost within business area	Pollution prevention	4,163	195.4	2,451	59.3
	Environmental protection	820	58.8	1,195	54.4
	Managing flow cycle of resources	81	70.9	1,452	66.8
	Total	5,064	139.2	5,098	59.9
Upstream and downstream cost		—	—	358	110.8
Administration cost		46	71.5	1,546	87.3
R&D cost		—	—	3,764	98.0
Social activities cost		—	—	462	154.3
Environmental damage cost		—	—	192	63.7
Total		5,109	138.0	11,419	103.3

\*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 pollution prevention and environmental protection within business areas, as well as environmental management software for things like chemical management systems.

Effect of environmental protection (quantitative)			
Details of effect		Fiscal year 2000	%
Effect of environmental protection in business area	Amount of CO <sub>2</sub> emission	Product divisions: 6.15t-c/100 mill. yen	75.9
		Device divisions: 51.85 t-c/100 mill. yen	92.8
Effect of environmental protection in business area	Amount of waste reused	97,331t	203.7
	Amount of landfill disposed	1,693t	33.1
	Amount of polystyrene foam used	1,339t	104.8

Monetary effects of environmental protection measures			
Details of effect		Value (millions of yen)	%
Cost reduction as a result of energy saving		971	87.2
Profits from sale of recyclable waste		644	129.8
Reduction in cost of disposing of waste		132	—
Total		1,747	108.5

#### Environmental Protection Costs

The increase in investments costs includes priority investments to prevent industrial pollution, such as those in scrubbers and wastewater disposal plants.

The increase in upstream/downstream costs corresponds to an increase in output.

The increase in social activities costs is due to PR advertising for energy-creating photovoltaic power

generation systems and the strengthening of campaigns for the cleaning-up of local community areas.

#### Effect of Environmental Protection

Although polystyrene foam disposal increased due to a step-up in output, other environmental preservation effects registered quantitative improvement over the previous year.

#### Monetary Effects

The increased rate of monetary effect outstrips that of costs. Although the degree of social contribution to energy saving, as described below, can be accounted for, Sharp decided not to include the estimated effect since the evaluation system has no unified framework as yet.

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

The degree of contribution to energy savings brought about by environment conscious products marketed by Sharp in fiscal year 2000 (including TFT LCDs, photovoltaic systems, energy-saving major appliances, consumer electronics products and others) amounts to 2,087 GWh<sup>\*3</sup> over the course of these products' lifetime. This is equivalent to 22.3 billion yen, when calculated in terms of current electrical power costs in Japan.

\*3) Data for calculation

(1) Energy saved by TFT LCDs (208 GWh)

Formula: (Difference in annual power consumption when compared with CRT monitors) x (Output of TFT LCD panels for PCs in 2000) x 6.5 (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 2001)

(2) Energy generated by photovoltaic systems (963 GWh)

Formula: (Annual power generation by photovoltaic systems produced in 2000) 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)

(3) Energy saved by major appliances and consumer electronics products, including air conditioners, televisions, VCRs and refrigerators (916 GWh)

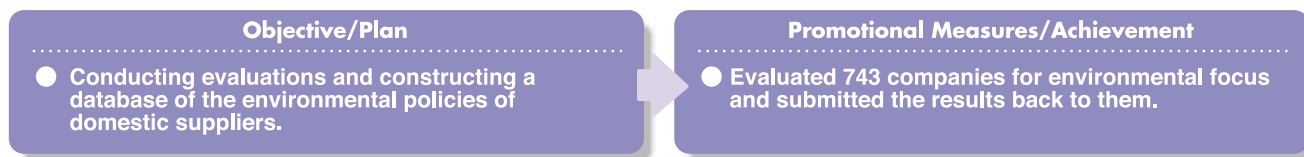
Formula: (Difference in annual power consumption when compared with their counterparts of the same class released in the previous year <intracompany data>) x (Number of units sold in 2000) x (Years of use)

Formula for annual power consumption: As per the energy-saving catalog published by the Energy Conservation Center

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 2001)

## IV. Green Purchasing

In February 2000, Sharp published the Green Purchasing Guidelines, which have been adopted on a company-wide basis, and with the help of its suppliers, has fully implemented a green purchasing system in Japan.



### 1. Assessment Standards and Purchasing Decision

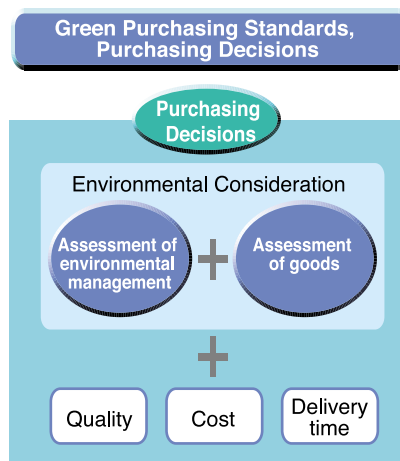
Sharp will now evaluate whether to purchase materials according not only to quality, cost and delivery time, but also based on whether the materials are environmentally friendly. The environmental impact of the materials will be assessed on two criteria: an evaluation of the environmental management system and a product/material evaluation. The product/material evaluation will assess the impact that the materials or parts to be purchased have on the environment.



Green Purchasing Guidelines

### 2. Survey on Environmental Focus

In fiscal year 2000, Sharp conducted a survey targeting suppliers of domestic products. Sharp then submitted the evaluation results back to the suppliers and called on them during individual sessions to make improvements for the future. In order to obtain more precise information, Sharp plans to further improve survey methods in the future. From fiscal year 2001, Sharp will not only expand the survey to include suppliers of imported parts and components, but will also apply the evaluation system to parts procurement in Malaysia and other overseas production bases.



## Evaluation Items

### Main Environmental Requirements

- Acquisition of ISO 14001 certification, or introduction of EMAS<sup>1</sup>
- The company's philosophy, policy, goals, organization, education, and training regarding environmental protection.
- The company has a green purchasing system for their purchased parts and materials.
- The company discloses information on the details and results of its environmental protection activities.
- The company can provide MSDS<sup>2</sup> (material safety data sheets) for the sale of chemicals.

### Main Product/Material Requirements

#### Parts and materials

- The items purchased are packaged in an environmentally conscious manner.
- Elimination of chemical materials for the removal of harmful substances, 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.
- The company is working to use fewer resources by reducing the amount of material needed to make the product, using recycled materials and recycling materials in-house.
- The company is working to reduce the power consumed in making its parts or products.

#### Chemicals, equipment, tools, printed matter, office supplies, etc.

- The company provides MSDS (material safety data sheets) for the chemicals used at the Sharp factory.
- As a priority, Sharp will purchase equipment and tools for manufacturing and research that minimize the effect on the environment.
- As a priority Sharp will purchase printed matter (apart from that included with the products) and use as much recycled paper as possible.
- As a priority Sharp will purchase office products that are identified as meeting measurable environmental criteria.

\*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: describes the composition, harmfulness, legal restrictions and appropriate methods of handling chemical materials.

# Environmentally Conscious Products

## I. Green Products Development Policy

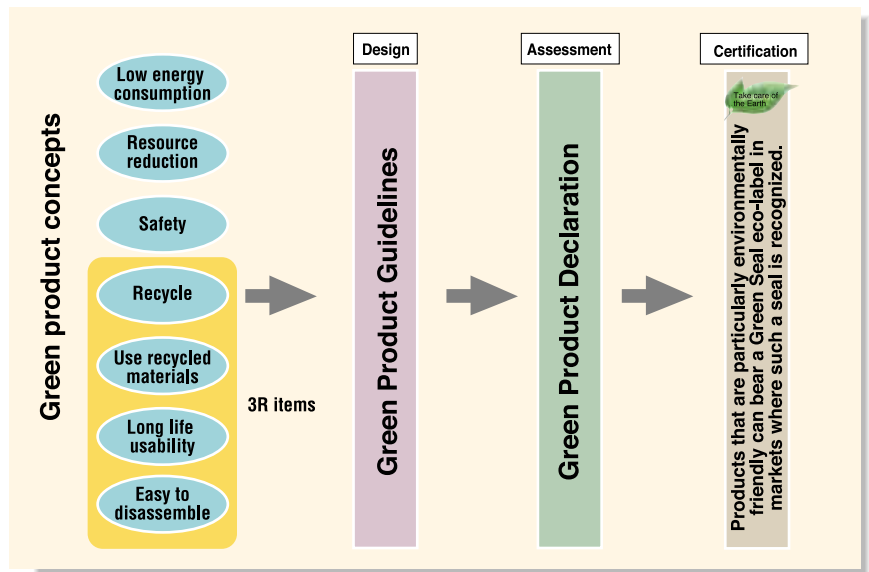
Our aim is to contribute to the sustainability of society by marketing a variety of “green,” or environmentally conscious products to our customers. Toward this purpose, Sharp has been working on our “Green Products Development” program to plan and design products so as to minimize their impact on the environment.

### 1. Development Process

Our new products are developed according to the Sharp “Green Product Guidelines,” which are based on seven concepts. The Green Product Guidelines provide the requirements for a product to be qualified as a Green Product, and the “Green Products Statement” within these guidelines shows how to evaluate the results. The guidelines have been applied to our domestic product development procedures since fiscal year 1999, and were introduced into overseas operations in 2000 for products for sale in the Japanese market. These guidelines have also helped us to achieve our “3R Objectives\*” for recycling parts easily and harmlessly. These Green Products are evaluated at each stage of planning, design, trial production and mass production in accordance with the Green Products Statement. In fiscal year 2000, our objective was to achieve 75% of the goal—an objective we surpassed substantially by achieving 83%.

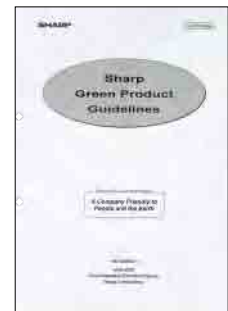
\* 3R Objectives consist of:  
 (1) reduction of waste,  
 (2) reuse of parts/products, and  
 (3) recycling of materials.

Green product development process



#### Green product concepts

- (1) **Products that are energy efficient and use little energy.**  
Our focus is on products that consume less power both when running and when in standby mode, and air conditioners/heaters that give more efficient cooling and heating.
- (2) **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.
- (3) **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.
- (4) **Recyclable products.**  
We choose materials that can be easily recycled or reused in products.
- (5) **Products made from recycled materials.**  
We emphasize the use of materials such as recycled plastic in making products.
- (6) **Products with a long life cycle.**  
We aim to design products that will last longer.
- (7) **Products that are easy to disassemble.**  
We design and build products so that they will be easy to take apart for recycling.



Green Product Guidelines

#### Number of products that have passed the Green Products Declaration

Audio-visual products	56
Home appliances	114
Telecommunication equipment	66
Information equipment, copiers and printers	73
<b>Total</b>	<b>309</b>



## 2. Sharp Green Seal System

Green Products of exceptional excellence are recognized in Japan as Sharp Green Seal products and identified with an original seal. The criteria for this standard were partially revised in October 2000.

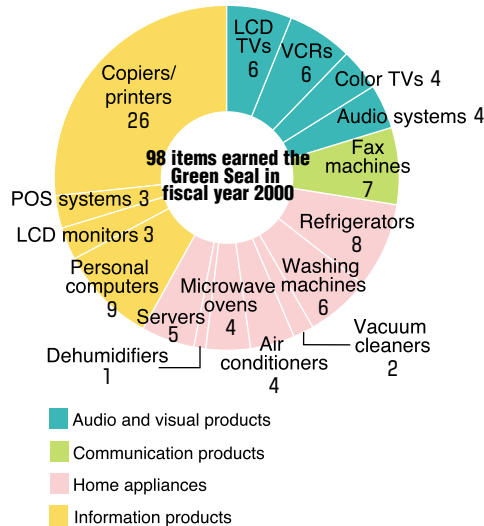
### Criteria for Green Seal Products

- : Original criteria
- ◎: Criteria revised or added in October 2000
- The product should attain the most energy-efficient operating performance among others in the market at that time.
- The product should attain the most energy-efficient standby performance among others in the market at that time.
  - Models with standby power consumption of 0.1 watt or less (for TV sets, videocassette recorders and air conditioners)
  - ◎ Models with standby power consumption of 1.0 watt or less (for telephone sets, fax machines, and personal computers)
- ◎ The product should be one of the most resource-saving models among others in the market.
- ◎ The product should be made of easily recyclable materials.
- ◎ The product should be made of green materials (e.g., use lead-free solder, not use halogenated fire retardants, and use substitutes for vinyl chloride)
- Models that have won awards from other official organizations for their energy saving efforts.
- Other environmentally friendly models using state-of-the-art technology.



The Green Seal

### Details of green seals products for fiscal year 2000



### Green seal products of fiscal year 2000



## 3. Introduction of Life Cycle Assessment (LCA)

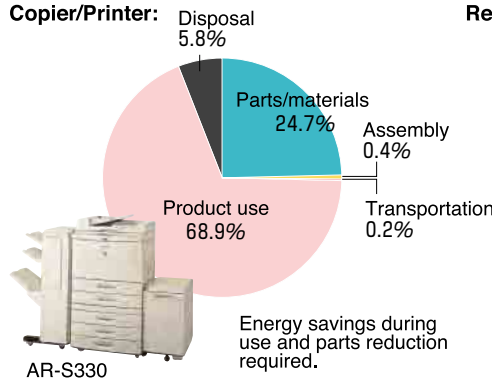
Life Cycle Assessment (LCA) is a method to comprehensively assess the environmental impact of a product over its entire life cycle, from extracting resources to production, sales, use and final disposal. Sharp has introduced LCA in our main Japanese product models to achieve the following objectives:

- (1) to develop products with less burden on the environment,
- (2) to disclose information on environmental impact and our effort for improvement, and
- (3) to improve production processes.

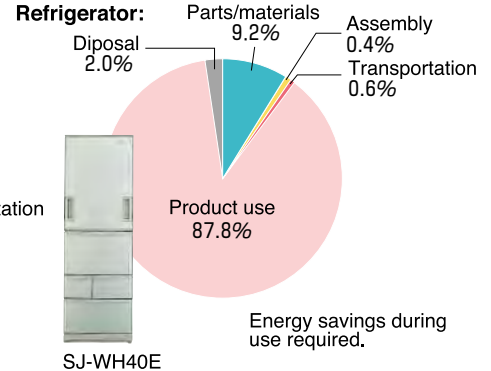
After completing the database system and revising the assessment method, Sharp intends to apply the LCA system in Japan in 2001.

### LCA evaluation of environmental impact (on carbon dioxide emission) caused by producing/using products

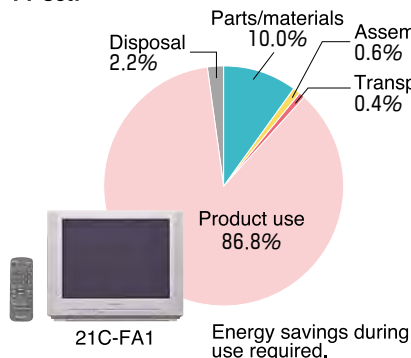
#### Copier/Printer:



#### Refrigerator:

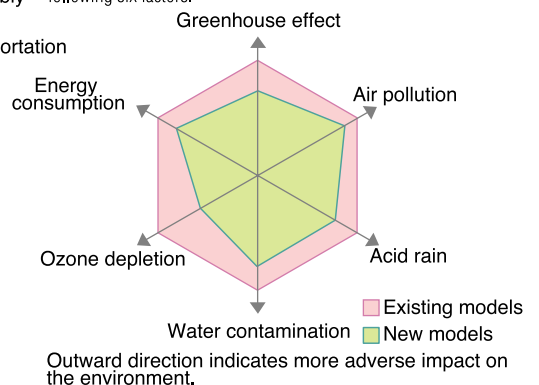


#### TV set:



### Model chart for comprehensive evaluation

Sharp will evaluate its products based on the following six factors.



## II. Product Development in the Light of Saving Energy and Resources

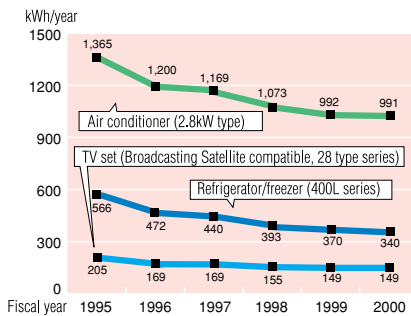
Sharp has continued to develop technologies to reduce both the standby and operational power consumption of products, so that less carbon dioxide is discharged. Sharp has also made efforts to downsize products and streamline production in order to use fewer parts and materials.

Objective/Plan	Promotional Measures/Achievement
<ul style="list-style-type: none"> <li>Planned to develop models that achieve the lowest level of energy consumption in the market.</li> <li>Planned to acquire the Green Seal for 80 models, which account for 25% of its total product sales in Japan.</li> </ul>	<ul style="list-style-type: none"> <li>Marketed 98 Green Seal models, 22% higher than our plan.</li> <li>These models accounted for 25.7% of our total product sales.</li> </ul>

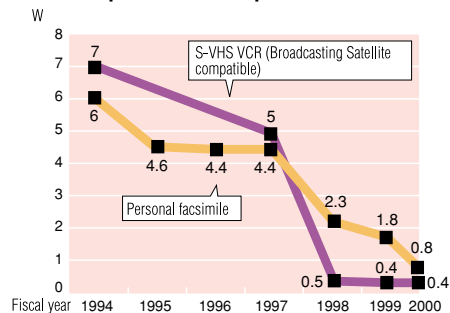
### 1. Development of Energy-saving Technology

Sharp has worked on developing integrated energy-saving technology for its products, from the assembly of parts to finished goods, in order to reduce their power consumption during use and in standby.

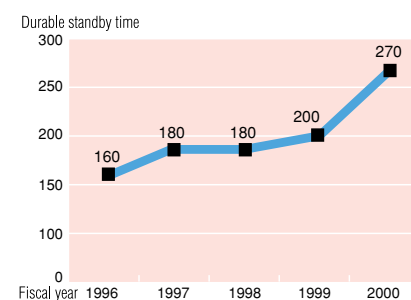
#### Electric power consumption of main products in Japan



#### Standby electric power consumption of main products in Japan



#### Standby operating time for mobile phones in Japan



### 2. Major Energy-saving Products

#### Refrigerator (SJ-LC47E/40E)

Sharp has developed the New Hybrid Cooling System. This system combines the Twin Evaporator System, which features two separate fan coolers for freezer and refrigerator sections, and the Refrigerating System, which has a moisturizing panel on the back side. It also incorporates Wide Linear Inverter Compressor Control, which controls condenser revolution in 25 steps, and our non-CFC vacuum insulation. Overall, this system offers a 5.2% improvement in cooling efficiency and helped the SJ-LC47E/40E win the Energy Conservation Award in February 2001 from the Energy Conservation Center in Japan. Our refrigerator models have won this award four times, including the last two consecutive years.

#### VCR (VC-V1)

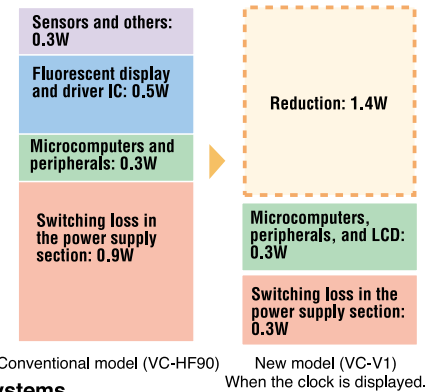
Our new model VC-V1 has reduced standby power consumption by 70%\* in comparison with conventional models. This was achieved by improving energy efficiency of the power supply circuit, switching off unnecessary circuits during standby mode, and replacing the fluorescent display with an energy-saving liquid crystal display.

\* Power consumption is reduced by 70% when the clock is on in the display.

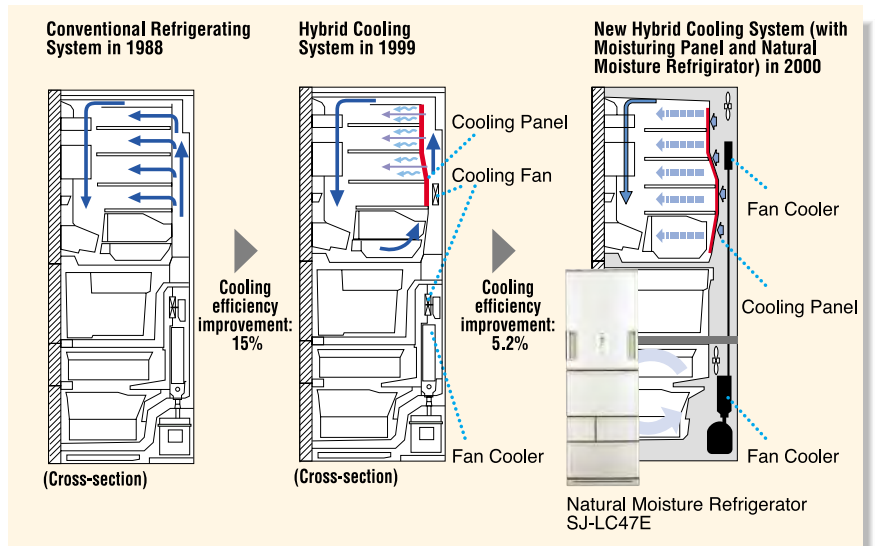


Hi-Fi VCR VC-V1

#### Standby power consumption



#### Transition of energy-saving refrigerating systems



### Facsimile Machine (UX-F41CL)

Since fax machines are always on, reduction of standby power consumption is particularly important. Sharp has therefore made every effort to reduce the required number of parts, develop the LSI for peripheral circuits, and achieve efficiency in the power supply circuit. Sharp has also successfully switched off unnecessary circuits during the standby mode. Paying careful attention to these factors, Sharp attained a 0.8W level of standby power consumption.



Facsimile UX-F41CL

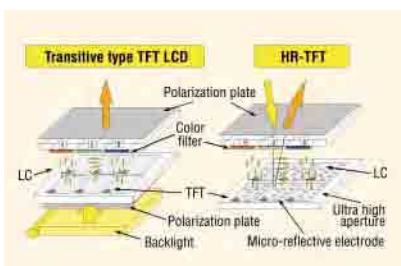
### Super-Mobile LCD (HR-TFT)

The Super-Mobile LCD attains a brighter liquid crystal display than before by reflecting external light, rather than using a backlight. This was made possible by combining the Micro-reflective electrode construction, in which the electrodes not only drive TFT elements but also reflect the light, and an ultra high aperture LCD. The Super-Mobile LCD uses only one seventh of the power required by a transitive type LCD, resulting in both increased energy efficiency and longer battery life. The Super-Mobile LCD is incorporated into Sharp's popular PDA and other mobile products.



Personal Information Tool M1-E1 with Super-Mobile LCD

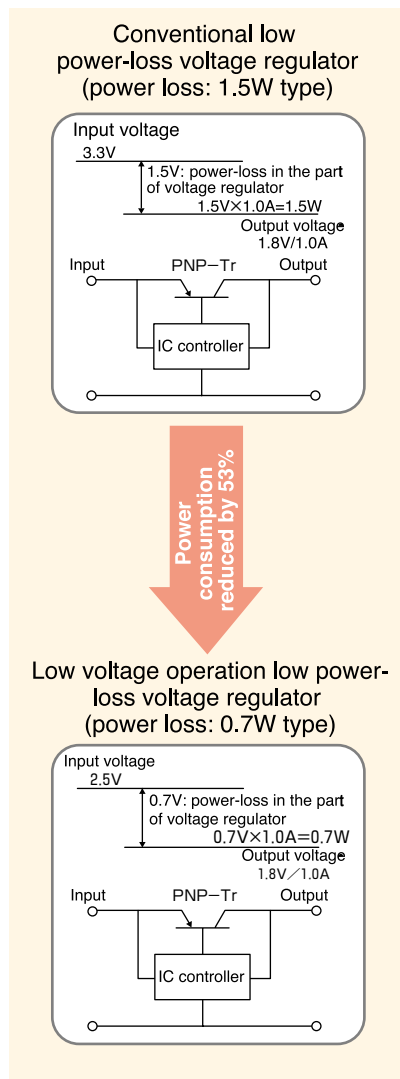
### Conventional (Transitive) TFT LCD and Super-Mobile LCD



### Power Device

The ICs in electronic equipment operate in individual different voltage circuit. For that purpose, regulator makes stable decreased output voltage from high input voltage to meet the individual ICs operation conditions. Conventional regulators require a voltage difference of more than 2.5V between input voltage and output voltage, but our newly developed low power-loss voltage regulator requires a minimum of only 0.5V. This contributes substantially toward reducing the equipment's overall power consumption. Additionally, the regulator itself consumes 53% less power than before. And, when the equipment is not in use, standby power consumption is only one hundredth of what it was before.

### Conventional low power-loss voltage regulator and low voltage operation low power loss voltage regulator



## 3. Development of Resource-saving Products

Sharp has been engaged in developing a washing machine that not only saves resources but also requires less water for washing. Another product of a similar kind is our Cyclone vacuum cleaner, which does not need disposable paper dust-collection bags.

### Washing Machine (ES-WD74)

Our new washer/dryer requires 105 liters less water per wash, or approximately 38,300 liters less water annually (when using the washer 365 times a year), compared with Sharp's conventional automatic washing machine, the ES-B750, which was developed 8 years ago. In addition, this new washer uses less detergent and less electric power.

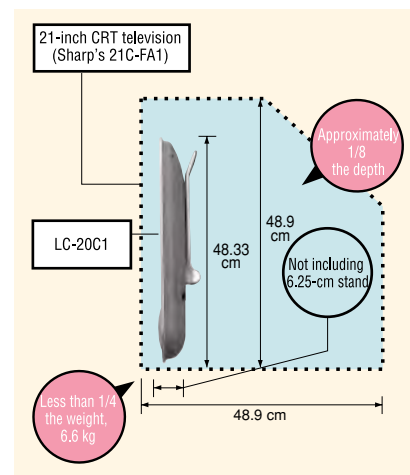


Washer/Dryer ES-WD74

### LCD TV (LC-20C1)

Sharp's new LCD TV is one fourth or less as heavy, and about one eighth as thin, as a CRT TV of the same screen size. Sharp continuously strives to achieve such downsizing and weight savings in our products to reduce consumption of the Earth's limited resources.

### Comparison of CRT and LCD televisions



### III. Development of Products that are Safe to Use and Dispose

Sharp has discontinued or cut back on the use of materials that may cause harm to people and other creatures when the product is used or disposed. Sharp has particularly focused on discontinuing the use of lead, halogenated flame retardants and vinyl chloride.

Objective/Plan	Promotional Measures/Achievement
<ul style="list-style-type: none"> <li>● Introducing two items with lead-free solder within 2000.</li> <li>● Using lead-free solder in all new products in domestic production from April 2001.</li> <li>● Stop using lead stabilization agents for cords of new products from April 2001.</li> <li>● Discontinuing the use of halogen compounds for housings and circuit boards for all products by March 2003.</li> </ul>	<ul style="list-style-type: none"> <li>● Introduced lead-free solder in LCD ViewCam (VL-MX1) and refrigerator (SJ-WS35E) production.</li> <li>● Introduced lead-free cords to 8 new products in 2000.</li> <li>● Introduced olefin elastomer (non-vinyl chloride) for door packing of refrigerators.</li> <li>● Introduced non-halogen compounds housings for personal computers, LCD TVs, etc in Japan.</li> </ul>

#### 1. Lead-free Solder

The accumulation of lead in the human body may cause damage to the central nervous system, and, in the case of a child, may even stunt growth. Sharp has worked hard to replace conventional solder with lead-free solder, which uses tin, silver and copper instead of lead. In fiscal year 2000, Sharp began using circuit boards with lead-free solder in its LCD ViewCams and refrigerators, and also started using lead-free solder for coating electrode terminals. Sharp has even prepared guidelines for carrying out the use of lead-free solder in product production.



Guidelines for the use of lead-free solder

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

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.



#### 2. Introduction of Lead-free Cords

To eliminate even this potential for exposure, Sharp has been using lead-free AC cords in collaboration with an electric cord manufacturer since fiscal year 2000. The lead-free cords will be applied to newer products first, followed by efforts to adapt them to other products.

##### Products with lead-free cords

Facsimile machines  
Microwave ovens  
Air conditioners  
Vacuum cleaners  
Fan heaters  
Audio systems  
LCD TVs

##### Products with lead-free solder



LCD ViewCam



Lead-free soldered circuit board



Refrigerator



Lead-free soldered circuit board

#### 3. Reduction of Halogen Compounds

Halogen compounds have flame-resisting characteristics and are used in plastic cases and boards. Vinyl chloride contains chloride, a halogen compound. Because halogen compounds may form dioxins under certain conditions of incineration, Sharp has been engaged in replacing halogen compounds with safer alternatives.

##### Products free of halogen compounds

LCD notebook computer made with non-halogen compound material



LCD TV with non-halogen compound material

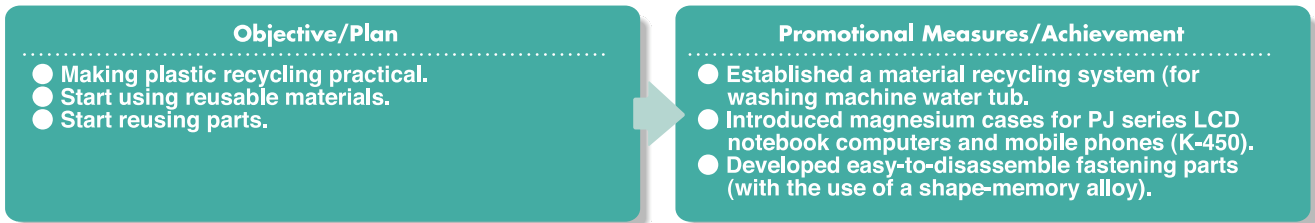
Refrigerator using olefin elastomer for door packing



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

## IV. Product Development Complying with 3R Objectives

In order to become a “recycling oriented society” and use resources effectively, we need to pursue 3R Objectives: (1) reduction of wastes (Reduce), (2) reuse of parts/products (Reuse), and (3) recycling of materials (Recycle). Sharp has solicited a lot of information on recycling electronic appliances in Japan, and the knowledge gained from feedback is being utilized for designing and developing products to meet 3R Objectives.



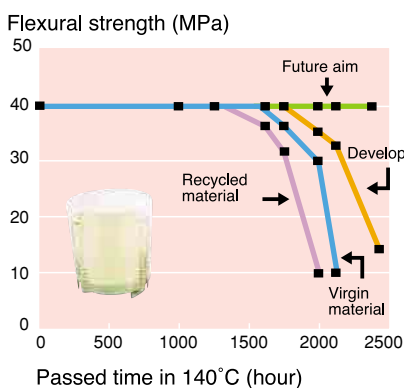
### 1. Establishment of Plastic Recycling Technique

Many types of plastics are used in home appliances. Sharp has worked on a plastic recycling system since 1999 and finally developed a successful recycled material by adding certain chemical mixture to a plastic. The recycled plastic has the same strength as virgin material and achieves satisfactory cost performance. Sharp first plans to use this recycled material in water tubs of new washing machines and will subsequently apply it to other existing models. Various kinds and qualities of plastics are used in products

Comparison of polypropylene (PP) resin for washing machine water tubs

	Virgin material	Recycled material
Flexural strength	100	98
Drop impact strength	100	100
Cost	100	80

### Improvement of long-term reliability of recycled material in washing machine water tubs

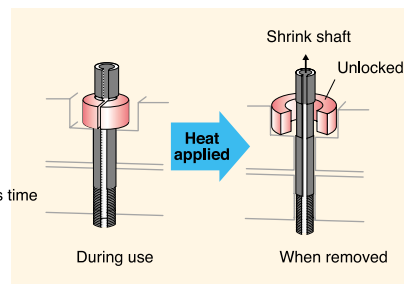


according to their application. If different kinds of resin are mixed when recycling, the quality of the plastic is lowered and it may not be suitable for use as a parts material. Sharp, therefore, as standard practice, limits the kinds and grades of plastic used in the cabinets of its products to two types with 3 grades or less. Sharp also has made efforts to integrate and standardize systems for better recycling from the design stage onwards.

### 2. Easily Removable Screws

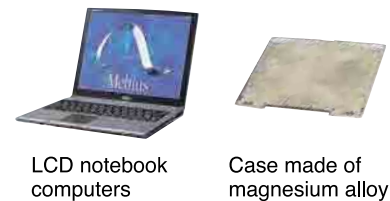
In order to recycle and reuse the parts, they must be disassembled, which is a labor-intensive operation. It actually takes more time to disassemble the used products than it did to assemble them originally if screws are rusty after their long service. Sharp, therefore, has been developing screws made of shape-memory alloy or resin, which are easily removed by simply applying heat.

#### Shape-memory alloy or resin, which are easily removed



### 3. Easily Recyclable Materials

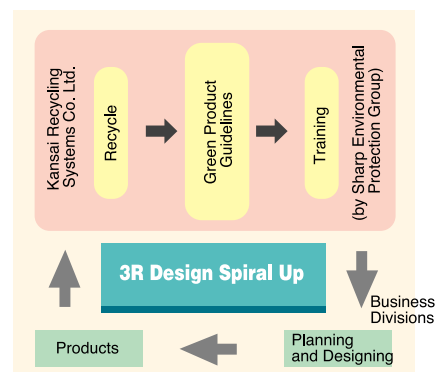
As a substitute for plastics, which are difficult to recycle, Sharp has begun using magnesium alloy for the cases of lightweight products such as LCD ViewCams, LCD notebook computers and mobile phones. Magnesium is light, extremely strong and abundant on the Earth.



### 4. System to Achieve 3R Objectives

Sharp devised “Green Product Guidelines” to further emphasize 3R Objectives. With regards to material recycling objectives, Sharp established a system to collect information from actual recycling operations, in collaboration with Kansai Recycling Systems Co., Ltd., to get feedback for designing new products.

#### System to achieve 3R Objectives for product design



## V. Reduce the Amount of Packaging Materials

Sharp has been working for the past five years on reducing the consumption of packaging materials. Since polystyrene foam is considered to have adverse effects on the environment, we have tried hard to replace it with paper based materials. We are also trying to reduce our use of all other packaging materials, including cardboard, paperboards and plastics.

### Objective/Plan

- In 2000, reduce polystyrene foam consumption by 50% from 1995.
- Stop using polystyrene foam for products less than 5 kg in weight.
- Stop using polystyrene foam for products between 5 kg and 10 kg by March 2003.

### Promotional Measures/Achievement

- Total polystyrene foam consumption for the year for domestic sales was 1,339 tons, down 39.4% from 1995.
- Sharp discontinued the use of polystyrene foam among products less than 10 kg in weight for 17 categories.

### 1. Our Efforts to Reduce the Use of Polystyrene Foam

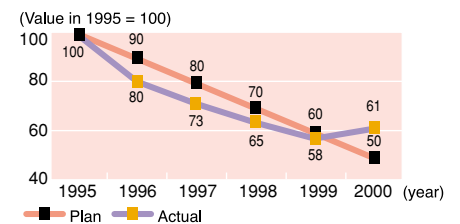
As sales of large-sized appliances increased, Sharp was not able to meet our reduction goal. For products under 5 kg, however, Sharp was able to discontinue almost all use of polystyrene foam in most of the products that are taken home by customers. The percentage of reusable packaging materials is now approximately 90% (by weight). In 2001, Sharp will continue our efforts to discontinue the use of polystyrene foam for all products between 5 and 10 kg, as well as to decrease the overall use of this material by 5% from the previous year. Sharp will

also work to reduce all packaging consumption by 3% from the previous year.

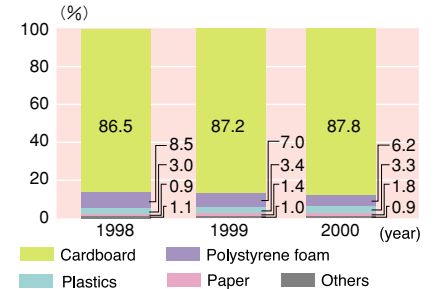


Cardboard packaging for a room air conditioner

### Consumption of polystyrene foam (for domestic sales)



### Component ratios of packaging materials (for domestic sales)



## VI. Environmental Recognition Through the Acquisition of Environmental Eco-Label Seals

Environmental Eco-Labels, describing how the product impacts the environment, are placed on products. This helps customers to understand the company's attitude toward the environment and the environmental characteristics of the products. Sharp continues to actively develop products with such seals and disclose environmental information on our products.

### Acquired Environmental Eco-Labels (the number of models acquiring environmental seals in 2000)

#### International Energy Star Program

**Countries:** Japan, U.S., EU nations, etc.

**Scope of products:** TV sets, VCRs, office automation equipment, others

Televisions	LCD TV	VCRs	DVD players	Audio systems	Copiers	PCs	Printers	Facsimiles	Monitors
30*	5	11	5	9	35	53	13	24	11

\*Including one VCR/TV combo model

#### Environment Choice Program

**Country:** Canada

**Scope of products:** All

Copiers
5

#### Nordic Environmental Label

**Countries:** Sweden, Finland, Norway, Iceland, Denmark

**Scope of products:** Office products, audio/visual products, others

Copiers
7

#### TC099

**Target country:** Sweden

**Scope of products:** PCs, PC displays, others

Monitors
4

#### GEA Label

**Countries:** EU nations

**Scope of products:** TV sets, VCRs, office automation equipment, others

VCRs
18

#### Thailand Green Label

**Country:** Thailand

**Scope of products:** Air conditioners, refrigerators, fluorescent tubes, office paper, others

Refrigerators
22

#### China Green Label

**Country:** China

**Scope of products:** Refrigerators, secondary batteries

Refrigerators
14

#### Energy-Saving Label

**Country:** China

**Standards:** Electric power consumption

Refrigerators
4

#### Eco Mark

**Country:** Japan

**Scope of products:** Copiers, personal computers, printers, others

Copiers
26

# Environmentally Conscious Factories

## I. Guidelines for Promoting Green Factories

Sharp carries out unique environmental promotional activities utilizing the ISO14001 environmental management system with the aim of turning all its factories into green factories.

### 1. Green Factory Concepts

- (1) Impact on the atmosphere, water systems and soil should be minimized.
- (2) Emission of waste should be minimized.
- (3) Resource consumption should be minimized.
- (4) Energy consumption should be minimized.
- (5) Emission of greenhouse gas should be minimized.
- (6) Environmental pollution and the risk of accidents by chemical materials should be minimized.
- (7) Efforts should be made to live in harmony with local communities.
- (8) Information on the environment should be disclosed.
- (9) Efforts should be made to preserve and restore nature inside and outside the business site.
- (10) Employees should be highly aware of the environment.

### 2. Green Factory Guidelines

The Green Factory Guidelines are intended to improve environmental performance as outlined in the environmental management system. These guidelines provide additional themes (such as coexisting with local communities and nature) in order to develop more extensive activities for environmental preservation. We established a basic edition of the guidelines in 1999. In February 2001, we issued a revision to that document, which included practical promotional activities, and have applied it to our domestic factories. We plan to introduce these guidelines to our overseas production bases starting in fiscal year 2001.



Green Factory Guidelines

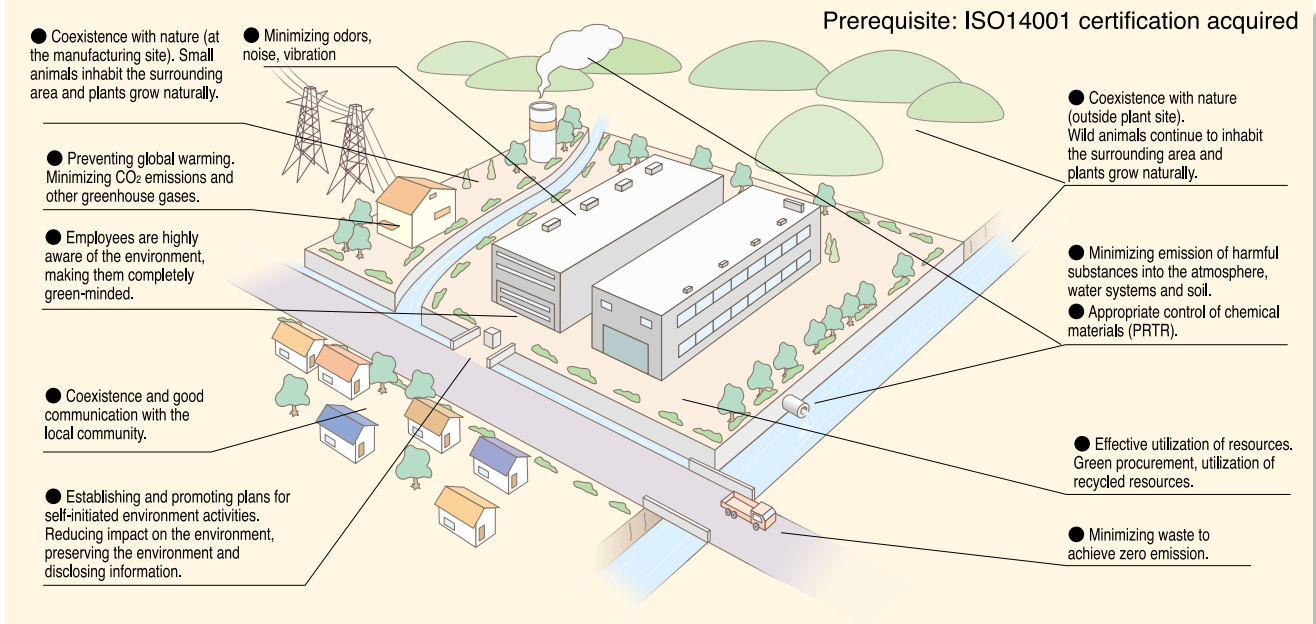
### 3. Promoting Top-Priority Concerns

We identified the following top-priority concerns and are striving to deal with them at all our bases.

#### Top-Priority Concerns

- Preventing global warming  
Rational use of energy and reducing emissions of CO<sub>2</sub> and other greenhouse gases
- Contributing to a sustainable society  
Reducing industrial waste (achieving zero emissions)
- Reducing emissions of harmful chemical materials  
Reducing emissions of harmful chemical materials into the atmosphere and water systems

### Conceptual view of a Green Factory



## II. Preventing Global Warming

Conserving energy at our plants and offices will help to reduce CO<sub>2</sub> emissions, which are believed to contribute to global warming. As part of our energy-saving promotional activities, we set an objective to reduce CO<sub>2</sub> emissions per production unit in fiscal year 2010 by 25% using fiscal year 1990 levels as basic line in Japan.

Objective/Plan	Promotional Measures/Achievement
<ul style="list-style-type: none"> <li>● Domestic: Reducing CO<sub>2</sub> emissions per production unit by 2% annually. Cutting CO<sub>2</sub> emissions per production unit by 25%, when compared with that for fiscal year 1990, before the end of fiscal year 2010.</li> <li>● Overseas: Cutting CO<sub>2</sub> emissions per production unit by 2% annually on the basic year of fiscal year 2000.</li> </ul>	<ul style="list-style-type: none"> <li>● Domestic: Reducing energy consumption by 11.2% from the previous year (24% cut in product production sites; 7.2% cut in devices production sites)</li> <li>● Overseas: Starting centralized control of statistical data. Discharged 93,101 t-CO<sub>2</sub> in fiscal year 2000.</li> </ul>

### 1. Reducing CO<sub>2</sub> Emissions at Domestic Production Sites

Carbon dioxide emissions at all our domestic production sites in fiscal year 2000 totaled 353,440 t-CO<sub>2</sub>, a 1.3% increase over the previous year. In terms of production units, however, this actually means an 11.2% decrease over the previous year, successfully attaining the target value (2% cut annually). When compared with that for fiscal year 1990, the output-cost unit reached 74% in product production sites and 76% in devices production sites. This is the result of our introduction of high-efficiency facilities as well as promotions on saving energy and strengthening measurement control.

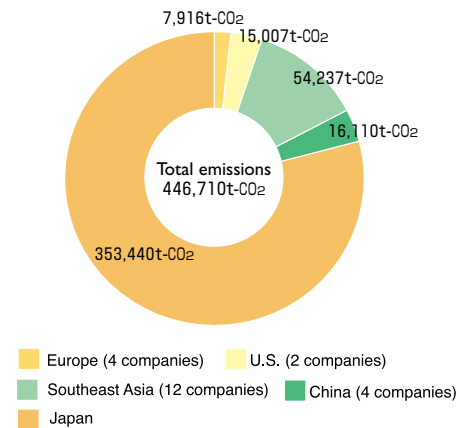
### 2. Reducing CO<sub>2</sub> Emissions at Overseas Production Sites

In fiscal year 2000, we established target values for each of our overseas production sites and offices as well as formed a centralized database to calculate the amount of energy used. Carbon dioxide emissions at all of our 22 overseas production sites in fiscal year 2000 amounted to 93,270 t-CO<sub>2</sub>\*, which is approximately 21% of the total emissions at all Sharp production sites. Our bases in Southeast Asia were responsible for 58% of the total emissions outside Japan, thus we need to reduce energy consumption there in particular. We intend to introduce examples of our energy-saving activities in Japan as

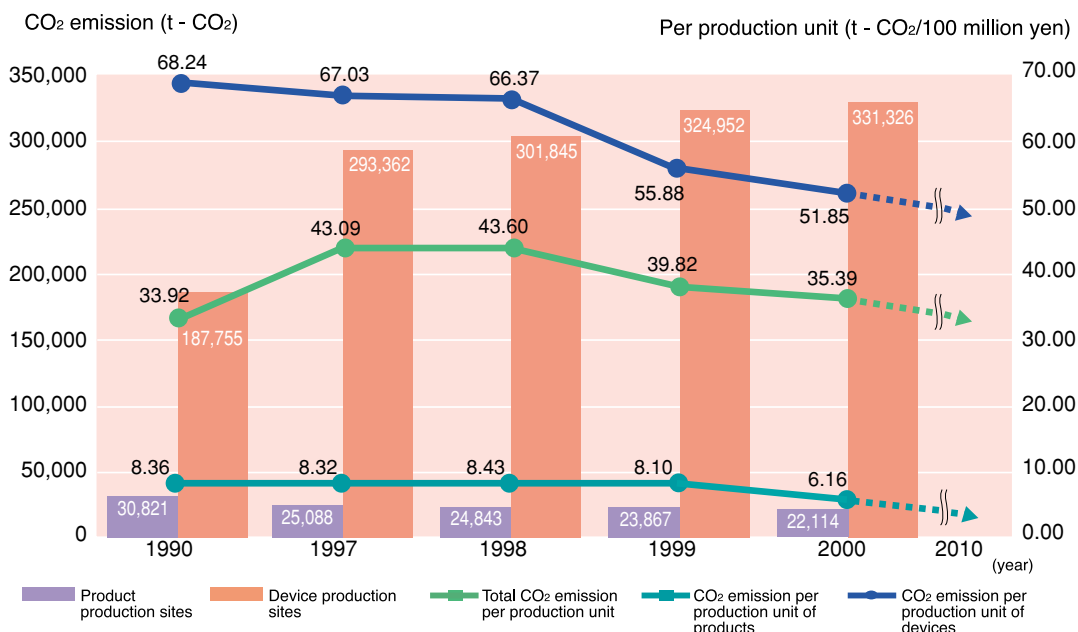
well as implement Green Factory Guidelines and carry out energy-saving analyses.

\*Conversion factors generally employed in Japan were used for calculating CO<sub>2</sub> emissions.

CO<sub>2</sub> emissions by area (calculated in terms of carbon dioxide)



Transition in CO<sub>2</sub> emissions by business category (at all domestic production sites)



All of our bases are striving to reduce CO<sub>2</sub> emissions per production unit by 25% by fiscal year 2010, using fiscal year 1990 levels as basic line.



### 3. Examples of Energy-Saving Activities

#### Changing heat insulation material of our diffusion furnace (Fukuyama site)

In the IC manufacturing process at our Fukuyama plant, we replaced the quartz wool used for heat insulation in our silicon wafer diffusion furnace with a high-performance heat-insulating ring, which resulted in an energy savings of 353 MWh per year.

#### Introduction of a new free-cooling system (Mie site)

The free-cooling system introduced at our Mie plant uses external temperature to create cold water, which is used to cool the air inside the facilities.

Employing a plate heat exchanger featuring double the heat exchange efficiency helped save 370 MWh of power a year. We also use an absorption-type LPG refrigerator, thereby reducing LPG consumption by 168 t a year.

#### Introduction of water-curtain external-air treatment (Fukuyama site)

Clean rooms used for IC production require a continuous supply of clean air with constant temperature and humidity and total removal of even the smallest quantities of chemical substances. We introduced a technique of water-curtain external-air treatment into the special air conditioner used for this purpose. Cutting energy for humidifying purpose enabled a reduction in CO<sub>2</sub> emissions of 410 t per year compared with the conventional method.

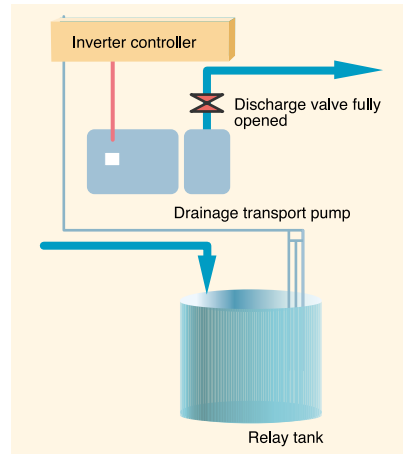


Water-curtain external-air treatment air conditioner

#### Inverter pump for drainage transport (Shinjo site)

We rebuilt the adjustment system controlling the volume of drainage discharge to transport to the water treatment facilities from conventional discharge-valve adjustment to inverter transport pump rpm control. This eliminated a loss of energy due to valve throttle, which resulted in a CO<sub>2</sub> emissions reduction of 147 t per year.

#### Inverter-controlled transport pump



#### Introduction of a new nitrogen gas manufacturing device (Mie site)

We introduced a high-efficiency nitrogen gas manufacturing device into our Mie manufacturing LCD plant. Compared with the previous device, the new device reduces energy consumption by 10% or more and cuts CO<sub>2</sub> emission by 630 t per year. Moreover, we did away with conventional cooling systems that use CFC refrigerators and liquid nitrogen in order to eliminate the risk involved in the transportation of liquid nitrogen.

### 4. Activities for Reducing Other Greenhouse Gases

In addition to carbon dioxide, methane, nitrogen oxide, HFC, PFC and SF<sub>6</sub> and others are considered to be greenhouse gases. We use HFC as a refrigerant in refrigerators, and by improving our production process, we successfully achieved our target value of 0.5% or less emitted during production. Additionally, PFC and SF<sub>6</sub> are used in our semiconductor and LCD production, and we are now working to improve the efficiency of their use, replacing them with substitute materials and researching techniques for their destruction.

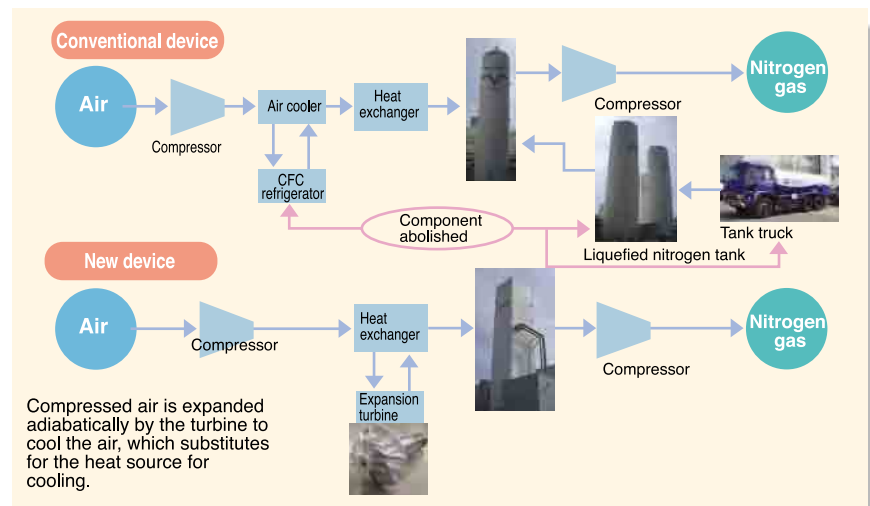
#### Examples of Activities for Reducing Greenhouse Gas Emissions

##### Reducing PFC (Fukuyama site)

We redesigned our semiconductor manufacturing process so that pure water could be used as a refrigerant instead of liquefied PFC. This resulted in a reduction in emissions of 1,332 GWPt\* PFC per year. By introducing a system that automatically detects when the IC etching process is completed, as well as optimizing chamber cleaning conditions for the CVD equipment, we successfully reduced emissions by 8,398 GWPt PFC per year.

\*GWPt: Unit of measurement calculated in terms of the amount of CO<sub>2</sub> to represent the degree of influence on global warming.

#### Comparison between the old and new nitrogen gas manufacturing devices



### III. Minimizing Waste

Sharp is committed to working towards the ideal of “zero emissions” by maximizing the amount of waste generated by Sharp sites that is segregated and recycled in Japan. All domestic sites are taking action to achieve zero emissions (less than 0.5% of waste to be sent for landfill or other final disposal for at least two months in a row) by the middle of fiscal year 2002.

Objective/Plan	Promotional Measures/Achievement
<ul style="list-style-type: none"> <li>● <b>Japan:</b> Final landfill disposal rate of less than 2% during fiscal year 2000. Reduce the total amount of waste generated by 2% compared to previous year.</li> <li>● <b>International:</b> 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.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Japan:</b> Landfill disposal rate of 1.5% company-wide. Amount of final landfill disposal: 1,693 tons.</li> <li>● <b>International:</b> Standardized company-reporting methods for waste. Total amount of waste generated in fiscal year 2000: 41,000 tons.</li> </ul>

#### 1. Minimizing the Amount of Waste Destined for Final Landfill Disposal

Sharp has increased the amount of material recycling by making every effort to classify and sort waste disposal, and by establishing recycling procedures for each class of material. Information on this effort was disseminated across the entire company and, as a result, the final landfill disposal rate for Sharp domestic production sites in fiscal year 2000 was reduced to 1.5%, surpassing our target of 2%. Sharp’s overall recycling rate has improved to 88.7%, and three of Sharp’s domestic sites (Tochigi, Mie and Tanabe) are actually achieving zero emissions standards.

#### 2. Reducing the Total Amount of Waste Generated

Compared to the previous year, the total amount of material destined for waste that was generated in Japan in fiscal year 2000 was cut by 11.9% at product production sites but grew by 57.9% for device production sites. Waste generation for Sharp production sites in Japan as a whole rose by 52.7%. In response, we are taking action to drastically reduce the sources of waste, based on a Waste Reduction Manual drawn up in June 2000. For fiscal year 2001, we have committed ourselves to a 2% reduction in generated waste per unit of production.

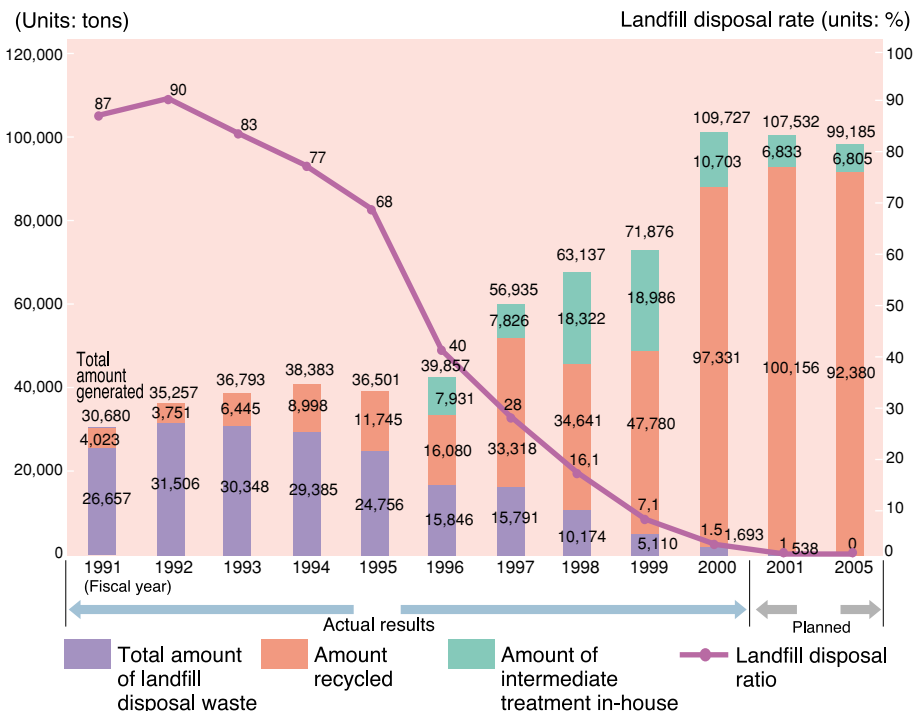


Waste Reduction Manual

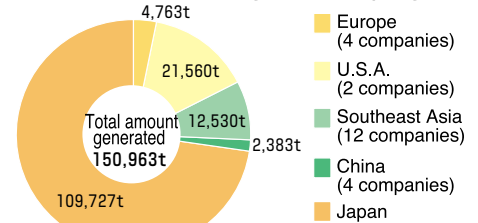
#### 3. Reducing Waste in our Overseas Production Sites

For fiscal year 2000, we made a concerted effort to set targets for all Sharp international production sites that are consistent with the targets for our sites in Japan. We have also begun to unify the management of disposal-related data compilation. The total amount of waste generated by Sharp’s overseas production sites in fiscal year 2000 was 41,000 tons, accounting for approximately 27% of the total from all domestic and overseas production sites combined. Operations in the U.S. accounted for 52% of the total amount generated from overseas production sites. This waste, however, consists primarily of wood-framed packaging material for shipping crates—materials that are fully recycled in the U.S. Beginning in fiscal year 2001, we will be operating according to the Sharp “Green Factory Guidelines” at all sites worldwide, and will be promoting additional measures to reduce the amount of waste generated by our business operations.

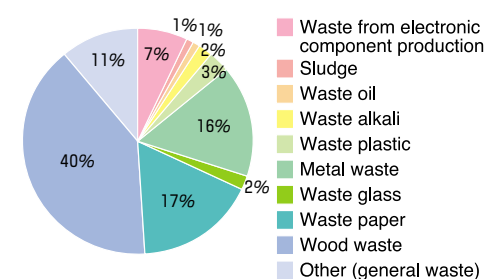
Amount of landfill disposal for waste for Sharp domestic sites



Total amount of waste generated by region



Detailed analysis of waste generated for overseas production sites



## 4. Recycling Examples

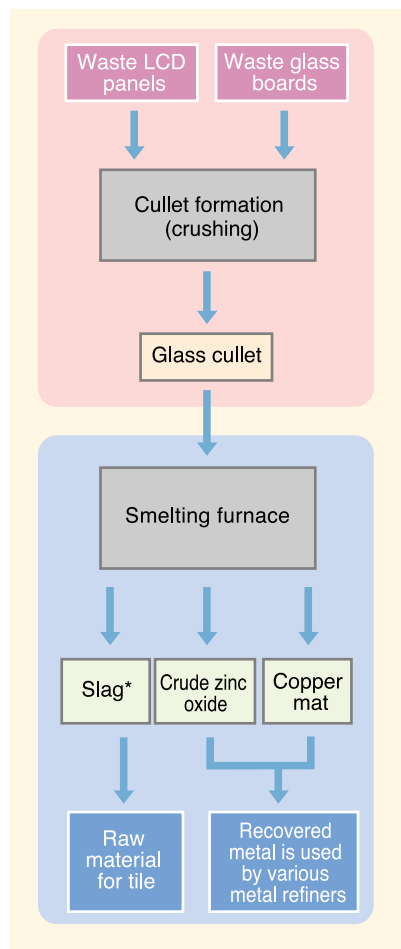
### Waste isopropyl alcohol (Fukuyama sites)

To expand the recovery of valuable solvents such as isopropyl alcohol (IPA) used in IC manufacturing, we have revamped our production facilities to reduce the mixture of water. As a result, we have been able to set new, more ambitious recycling targets and have achieved complete recovery of such substances, reducing waste by approximately 650 tons per year.

### Waste LCD glass panels (Tenri and Mie sites)

In fiscal year 2000, we also expanded the recycling of glass LCD panels assembled at our Tenri and Mie sites. In total, we recycled 579 tons of LCD glass for use as a silicon substitute in cement production and in smelting furnaces for metal refining.

#### Waste LCD glass recycling flow



\* The slag produced consists mainly of iron and silica.

### Waste plastic (Nara sites)

At our Nara sites, we introduced compacting equipment to meet the challenge of recycling waste plastic. A shredder/crusher reduces hard plastics to one-fifth of their original volume, while a pressure baler reduces the volume of soft plastics by two-thirds. This has allowed us to thermally recycle the entire amount of waste plastic produced (approximately 190 tons annually) as fuel for the generation of electrical power.



### Converting domestic sludge to fertilizer (Hiroshima sites)

We have introduced equipment to produce fertilizer from the sludge remaining after purifying wastewater from lavatories and sanitary facilities. The fertilizer will be used on trees and landscaping on the grounds of the facility itself.

#### Sludge recycling flow



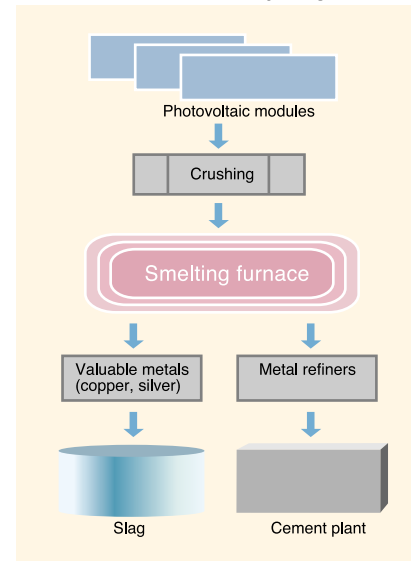
### Waste paper (Nara sites)

We have taken great pains to separate all office waste paper by grade, to ensure adequate volumes for outside recycling contractors. In fiscal year 2000, approximately 150 tons of these materials were recycled into paper pulp and other products, rather than being shredded or incinerated.

### Waste photovoltaic modules (Shinjo sites)

Since December 2000, we have been recycling waste photovoltaic modules at the manufacturing stage. These modules are crushed and the component materials separated into slag and valuable metals (copper and silver) using a smelting furnace. The metals are recovered at a refinery, and the slag is recycled as a raw material for cement. As a result, we estimate that we have been able to recycle 60 tons of photovoltaic modules per year.

#### Photovoltaic module recycling flow



## IV. Protecting the Earth's Environment

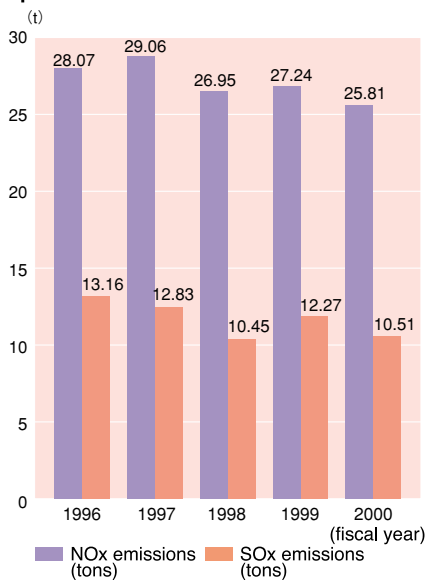
We are working to preserve the Earth's environment by striving to protect air, water and soil and by preventing unwanted noise, vibration, foul odors and ground subsidence. We are also preparing for emergencies, accidents and disasters, and constructing systems to respond appropriately in such situations.

### 1. Reducing Emissions into the Air

#### Taking action to prevent air pollution

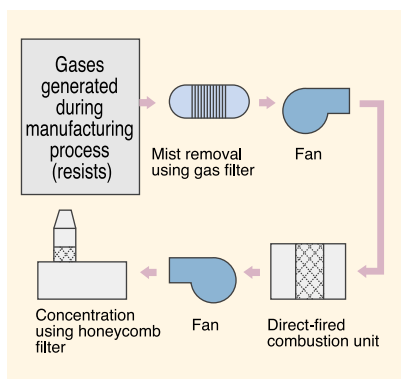
We are continuing our efforts to cut emissions of NOx and SOx by increasing the use of natural gas, which emits less of these air pollutants when burned than other comparable fuels.

#### NOx and SOx emitted for domestic production sites



#### Introduction of a direct-fired scrubber (Mie sites)

We have introduced a new system to concentrate exhaust gases such as dilute resist chemicals generated during the manufacturing process by 6 to 10 times and eliminate them by combustion. Chemical emissions into the atmosphere have been slashed dramatically as a result.

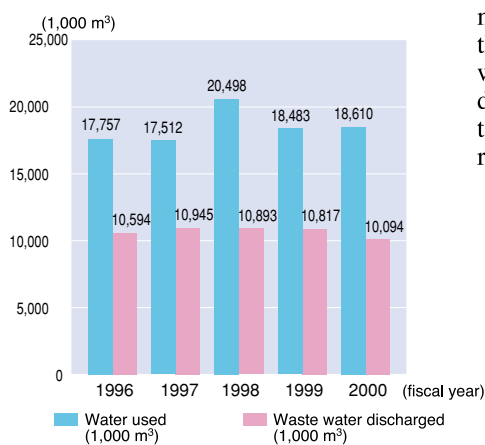


### 2. Reducing Waste Water Emissions

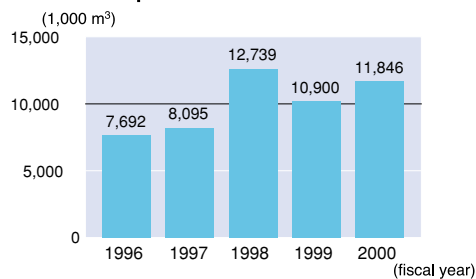
#### Taking action to reduce water usage

Operations related to device manufacturing use large amounts of water. We are working actively to reuse water in our sites by, for example, installing additional wastewater recovery equipment and increasing the cleanup and reuse of effluents such as waste alkali solutions from production processes.

#### Amount of water use and waste water discharged for all domestic production sites



#### Recovered and recycled water used in domestic production sites



#### Reuse of process effluent (Mie sites)

At our Mie LCD panel production site, we are cleaning up waste water chemical effluents to a level exceeding that of the water supplied to us. This recycled water is used in all normal production operations. Our water reuse rate improved from 82% in fiscal year 1999 to 87% in fiscal year 2000.

#### Taking action to reduce noise

##### Installing low-noise cooling towers (Mie sites)

We recently installed new cooling towers equipped with longer intake/outlet ducting. Soundproofing material was also affixed to the inside surfaces of the ducting to further reduce sound. This has resulted in significantly quieter operation, with noise levels 3 to 4 dB lower than previously installed equipment.

### 3. Reducing Soil and Ground Water Discharge

#### Fiscal year 2000 cleanup progress

The results of a 1998 soil and ground water survey of 11 of our Japanese sites revealed detectable pollutants at our Nara and Yao sites that must be cleaned up. The polluted areas are narrow in scope, limited to areas within the facilities, and did not extend beyond the boundaries of the site. We have since implemented continuous cleanup measures based on guidelines of the Japanese Ministry of Environment, and are making regular, ongoing reports to the government agencies involved as well as information disclosures to local residents.



Cleanup equipment

#### Measures have been taken to prevent the spread of pollutants

Sites	Cleanup status
Nara/Yao	Watertight barrier walls have been constructed around contaminated areas and cleanup sites. Ground water is being pumped out, followed by soil vapor extraction. Cleanup is proceeding steadily.
Tenri/Shinjo	The level of pollution was slight, and both Sharp and government agencies are monitoring ground water on a regular basis. It has been confirmed that current levels pose no problems.

## V. Management of Chemical Substances

Sharp is making a concerted effort to manage the chemicals used in our operations to minimize environmental impact. This includes limiting the volumes used and reducing the amount discharged into the atmosphere and public waters. We are also moving to eliminate the use of hazardous or toxic chemicals and/or find acceptable substitutes.

### Objective/Plan

- Implement chemical substances management systems at all domestic production sites.
- Compile lists of self-regulated chemical substances and formulate plans to reduce emissions (In Japan: targeting a 50% reduction from fiscal year 2000 levels by fiscal year 2003).

### Promotional Measures/Achievement

- Implemented chemical substances management systems at all domestic production sites. Centralized the management of information on chemical products used company-wide.
- Set up a Chemical Substance Management Committee.

### 1. Plans to Reduce Toxic Chemical Emission Levels

Sharp has set a goal of reducing toxic chemical emission levels to 50% of fiscal year 2000 levels by fiscal year 2003 in Japan, and is focusing management efforts on chemical substances that must be managed on a priority basis.

#### Criteria for priority managed chemical substances

1. Substances regulated by the PRTR Law that are released or transferred in large amounts.
2. Substances that risk causing annoyance to the general public living in the vicinity of a facility, regardless of amount.
3. Substances not covered under the 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. Chemical Substances management system

We are constructing a unique chemical substances management system with the goal of automatically recording the amounts of all chemicals purchased and used in Japan (over 4,000 substances) to enable accurate, timely reporting and management of the volumes used and discharged.

This system consists of a MSDS (1) Database containing chemical safety data, a "Chemical Substances Information Database containing data on legally regulated and self-regulated substances, and a system to manage the amount of purchased chemicals used, discharged and stored. This database will automatically compute inventory levels and generate report documentation for government agencies in compliance with the PRTR Law (2).

- 1 MSDS (Material Safety Data Sheet): a data sheet listing the composition, toxicity data, relevant laws and regulations, proper handling procedures, etc., for a chemical substance.
- 2 PRTR (Pollutant Release and Transfer Register) Law: official title is the Law Concerning Reporting of Discharge of Specific Chemical Substances into the Environment and Promotion of the Improvement of Their Management. Enacted in July 1999, this law mandates the comprehensive monitoring and reporting of chemical releases and transfers throughout Japan.

### 3. Results of PRTR Surveys for Fiscal Year 2000 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 ton/year during fiscal year 2000, Sharp facilities made use of 14 substances, totaling 2,679 tons. Of this amount, approximately 566 tons were released into the environment or transferred, accounting for 21.1% of the amount handled. Of the remaining amount, 57.7% (1,547 tons) were recycled as fuel, metal, etc.; 14.4% (385 tons) eliminated by reaction, chemical decomposition, etc.; and 6.7% (181 tons) were used in products. In the future, Sharp will continue with the reporting of data and information disclosure under the PRTR Law, and will commit itself to providing "risk communications" to build a relationship of mutual trust with consumers and residents living in the vicinity of our facilities, while gaining their understanding in this area.

#### PRTR Results

(Units: tons/year)

Covered chemical	PRTR number	Amount handled	Amount discharged or transferred				Recycled	Eliminated by processing	Consumed (shipped as part of products)
			Into air	Into water	As waste	Subtotal			
2-aminoethanol	16	1,756.85	3.42	0	266.66	270.08	1,462.30	24.47	0
n-alkyl benzen sulfonic acid and its salts (alkyl c-10-14)	24	4.28	0.08	0	4.20	4.28	0	0	0
xylene	63	14.80	1.97	0	5.50	7.47	0	7.33	0
silver and its water-soluble compounds	64	3.41	0	0	0	0	0.38	0	3.03
chlorodifluoromethane: HCFC-22	85	178.01	0.79	0	0.40	1.19	0	0	176.82
2-ethoxyethyl acetate	101	64.71	18.58	0	40.05	58.63	0	6.08	0
o-dichlorobenzene	139	58.62	13.18	0	45.44	58.62	0	0	0
N, N-dimethylformamide	172	31.49	0	0	1.89	1.89	0	29.60	0
1, 3, 5-trimethylbenzene	224	9.41	1.88	0	7.53	9.41	0	0	0
arsenic and inorganic compounds	252	1.58	0	0	0.84	0.84	0	0	0.74
hydroquinone	254	1.26	0.04	0	1.22	1.26	0	0	0
pyrocatechol	260	7.31	0.01	0	7.00	7.01	0	0.30	0
phenol	266	121.96	10.84	0	94.72	105.56	0	16.40	0
hydrogen fluoride and its water-soluble salts	283	425.71	0.09	36.97	2.97	40.03	84.43	301.25	0
<b>Totals</b>		<b>2,679.40</b>	<b>50.88</b>	<b>36.97</b>	<b>478.42</b>	<b>566.27</b>	<b>1,547.11</b>	<b>385.43</b>	<b>180.59</b>

# Activities Toward Achieving a Recycle-Oriented Society

## I. Recycling Policies

Recycling products whose useful life has come to an end play an important role in making effective use of the Earth's limited resources. Sharp is contributing to the achievement of a recycle-oriented society by developing systems using 3R (reuse, recycle, recover) technologies.

### 1. Action Programs

In Japan, we have begun appropriate recycling processing of four major home appliances—air conditioners, TVs, refrigerators and washing machines—under the Japanese Home Appliances Recycling Act, which took effect in April 2001. In the future, by strengthening business

activities that facilitate the recycling of used products, we will continue to extend our contribution toward a recycling-oriented society. Efforts to investigate and develop a recycling infrastructure to handle end-of-life products are also under way in Europe, Australia, and the US, where Sharp is providing funding for pilot collection projects.

### Sharp Recycling Activities Concept

- (1) Convenience for consumers, Sharp dealers, and local governments
- (2) Constantly work to increase the recycling percentage of materials collected and to completely eliminate all waste sent to landfills.
- (3) Use the latest recycling technologies, and improve the know-how for designing and developing products.

## II. Recycling Home Appliances

Kansai Recycling Systems Co., Ltd. began full operation in Hirakata City, Osaka, in April 2001, to comply with the Home Appliance Recycling Law in Japan. This company is working hard to ensure smooth operation of our appliance collection and recycling activities.

### Objective/Plan

- Build and operate recycling facilities for four home appliance categories under the Home Appliance Recycling Law in Japan.
- Develop closed loop recycling systems for plastics.

### Promotional Measures/Achievement

- Kansai Recycling Systems Co., Ltd. began full operation in April 2001.
- Recycled plastic is being utilized in washing machine water tubs (beginning October 2001).

### 1. Recycling Activities for Four Categories of Home Appliances

Kansai Recycling Systems Co., Ltd. is an urban-based recycling facility established as a joint venture between Sharp Corporation and Mitsubishi Materials Corporation, along with five other electronics companies. This plant has the capacity to process 600,000 units annually from four major home appliance categories.

The Association for Electric Home Appliances (AEHA) has set up "Appliance Recycling Coupon Centers (RKC)" around Japan. Sharp Corporation is participating in this project, and is supporting the smooth coordination of collection and recycling activities.

### 2. Recycling at Kansai Recycling Systems Co., Ltd.

In operational tests conducted in March 2001, Kansai Recycling Systems Co., Ltd. exceeded the legally mandated recycling (recommercialization) rate, and has continued to sustain this high rate since full-fledged operation began in April. Future plans call for revamping processing methods and making further improvements in recycling technologies. Target recycling rates for fiscal year 2001 are shown in the following table.

#### Recycling (recommercialization) rates for four appliance categories

Category	Legally required recycling rate	Actual values (for operation in April/May)	Target values for fiscal year 2001
Air conditioner	60%	82%	85%
TV sets	55%	68%	75%
Refrigerators	50%	59%	65%
Washing machines	50%	60%	65%



Kansai Recycling Systems Co., Ltd., Hirakata Recycling Plant

#### Facility overview

Processing capacity	600,000 units/year
Products recycled	Air conditioners, TV sets, Refrigerators, Washing machines
Processing methods	Disassembly, crushing and shredding, selection and sorting, CFC recovery
Site area	8,680 m <sup>2</sup>
Building	Offices: floors 1, 2, 3 Plant: floors 1 and 3 Building area: 2,860 m <sup>2</sup> Floor area: 5,200 m <sup>2</sup>



Hirakata Plant refrigerator disassembly line

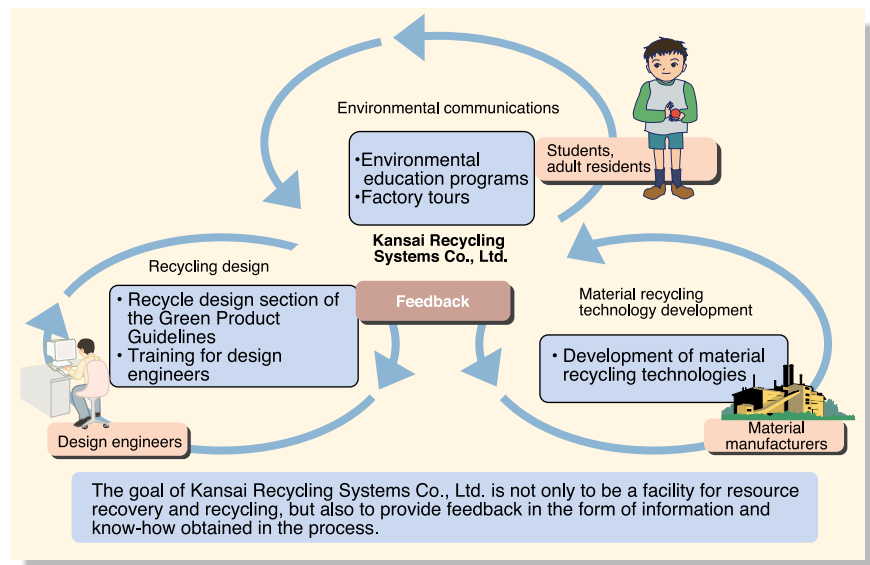
### 3. Information Dissemination From Kansai Recycling Systems Co., Ltd.

Sharp is using Kansai Recycling Systems Co., Ltd. as a platform to disseminate a wide variety of environmental information. The first is environmental education focused on elementary and junior high school students who will become the next generation of leaders. This newly opened facility is welcoming a large number of visitors from outside of Sharp, and is supporting local environmental education as a way of making a meaningful contribution to the community. At present, in cooperation with the City of Hirakata where the facility is located, we are conducting environmental education programs for elementary and junior high school students in the city. As of June 15, 2001, the facility had already hosted tours for 843 people from 56 different organizations. Secondly, this facility provides valuable feedback to our development departments for the promotion of 3R (reduce, reuse, recycle) product design. We are revising and enhancing the “recycle design” section of the Sharp Green Product Guidelines, aiming at improved recycling rates, and are also using this facility as a place to train design engineers. It is also providing feedback that is helping to facilitate the development of new material recycling technologies.

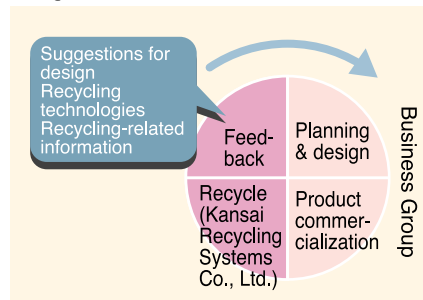
### 4. Recycling of Washing Machine Water Tubs

Sharp and Kansai Recycling Systems Co., Ltd. have jointly developed a technology to recycle polypropylene resin used for the water tubs of washing machines. The recycling process—manual disassembly followed by careful sorting and recovery—enables recovered washing machine water tubs to be processed into a raw material that can be used in the manufacture of new tubs. Water tubs that use reclaimed resin produced by this technology are expected to be available in October of 2001 in Japan. In the future, we intend to adapt this technology for other products, enabling more effective and efficient use of recoverable resources.

#### Role of Kansai Recycling Systems Co., Ltd.

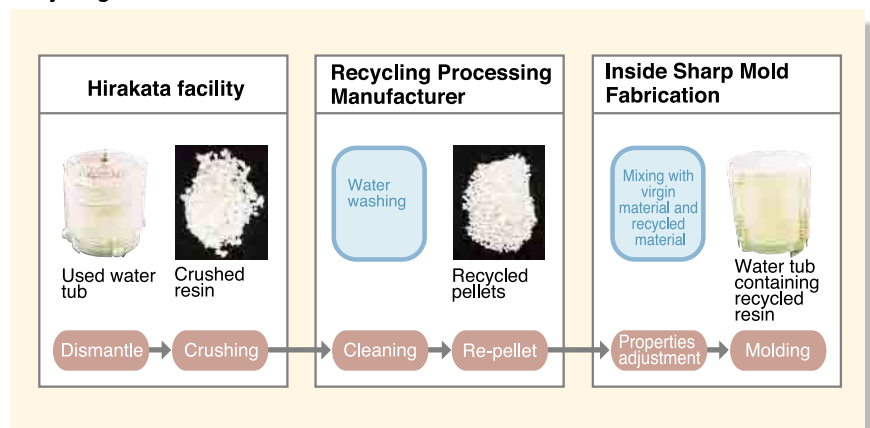


#### Feedback system for recycling design information



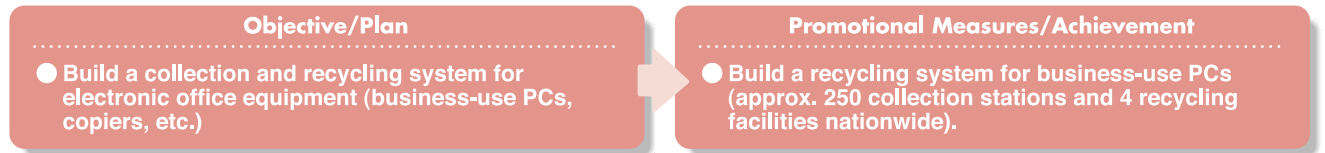
Students learn about TV set disassembly for recycling

#### Recycling flow



### III. Recycling Electronic Office Equipment

When the Promote Recycling of Resources Act in Japan went into effect in April of 2001, manufacturers became obligated to reuse and recycle business computers (including peripherals) and copiers whose service life has come to an end. Sharp had already taken action in remanufacturing copiers ahead of the enforcement of the law. We are also studying the implementation of a collection and recycling system for used home computers.



#### 1. Collecting and Recycling PCs

The majority of PCs for business use are provided to customers under a rental or lease contract. Typically, the leasing company will take back the equipment in response to a request from the customer. Sharp is working to develop an efficient recycling business reflecting this system, and has constructed a unique recycling system with 250 collection stations and 4 recycling facilities in Japan.

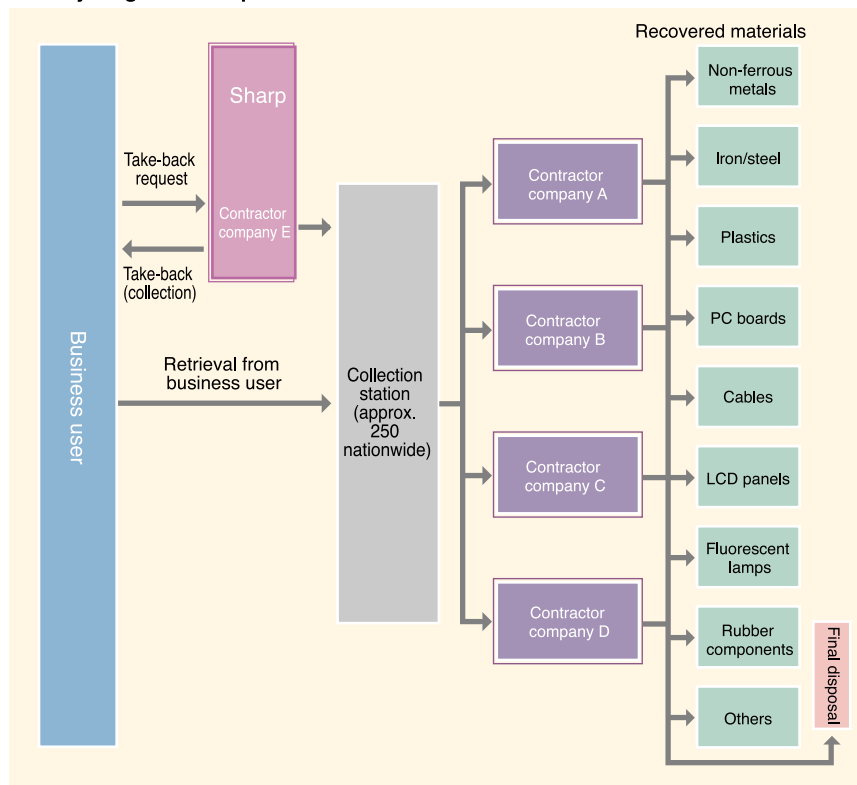


Collected PCs

#### 2. Remanufacturing of Copiers

Sharp has been promoting a remanufacturing system for copiers since 1997. Under this system, the used machines are collected, and, after an inspection to determine their general condition, disassembled into individual components. The parts are cleaned, subjected to a stringent inspection, and transferred to a remanufacturing production line. New components are installed as necessary, and ultimately a machine having the same quality as a newly manufactured unit is built. The Sharp SD-2150R (the "R" indicates a remanufactured unit) uses more than 75% remanufactured components by weight (more than 74% when measured by parts count). In fiscal year 2001, we will be starting export production of remanufactured copiers, mainly targeting the Southeast Asian market.

#### PC recycling flow in Japan



SD-2150R Remanufactured Copier

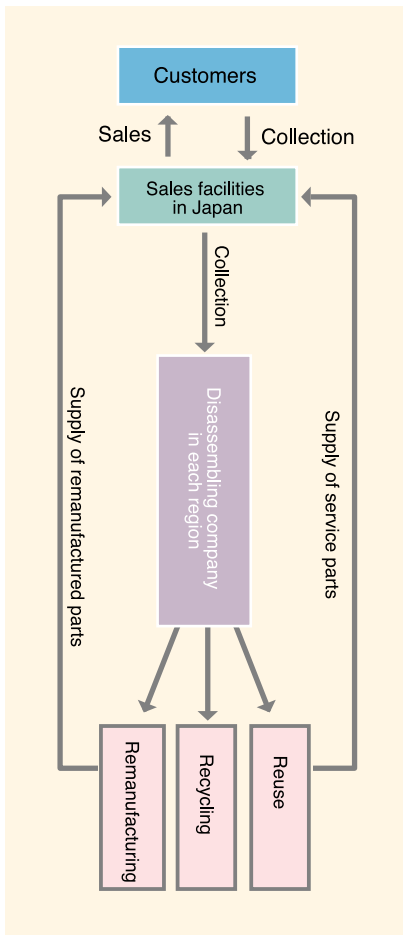


### 3. Collecting and Recycling Copiers

In fiscal year 2000, a system for collecting and recycling used copiers in Japan became operational. We have now established 114 collection stations nationwide and, in association with disassembling companies in Hokkaido, Saitama, Mie and Fukuoka, we are recovering resources for reuse in other products. Through this system, we collected and recycled 3,098 copiers in fiscal year 2000.

Since the end of 2000, we have been expanding our system for reusing components and will use even more of them, particularly the main circuit boards, as service parts (repair components) during fiscal year 2001.

#### Copier collection and recycling flow



### 4. Recycling LCD Modules

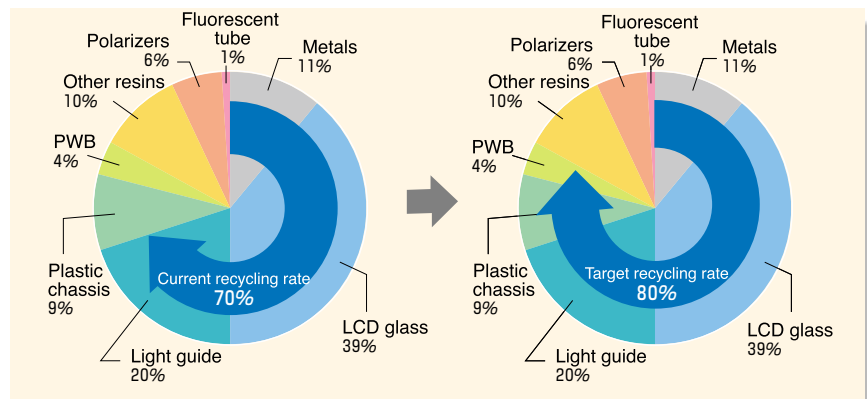
Sharp takes its responsibility as the leading LCD manufacturer seriously. In fiscal year 1999, we jumped ahead of other companies to develop technologies for recycling the glass panels used in LCDs. During fiscal year 2000, in addition to LCD glass, we worked to develop recycling technologies for various metals and the light guides, which account for a large percentage of an LCD panel's weight, thus enabling 70% of the weight of a panel to be recovered and recycled. The glass is turned into slag and reused as a material in the production of cement, and light guides are re-pelletized to become a material for decorative items. In fiscal year 2001, we are working to achieve an 80% recycling rate for LCD modules. We are aiming for recovery of useful resources contained in the plastic chassis (accounting for 9% of total panel

weight) and PC boards (4% of total weight), and developing applications for the materials they contain.

#### LCD module composition (Sharp 13.3-inch model)

Major components	% of total weight	Key materials
Metals	11	Stainless steel, aluminum, plated copper sheet
LCD glass	39	Glass, organic materials, others
Light guide	20	Acrylic resin
Plastic chassis	9	PC + ABS (includes glass fibers)
PC board	4	Noble metals (gold, silver), resins, glass fibers
Other resins	10	Resins (composite materials)
Polarizers	6	Organic materials (composite materials)
Fluorescent tube	1	Mercury, others

#### Currently achievable recycling rates and fiscal year 2001 targets



#### Recycling example: Acrylic light guide



# Increasing Environmental Awareness

## I. Environmental Education Programs

With a goal of creating an environmentally friendly corporate culture, we are providing environmental education and awareness programs for worldwide employees. In addition to general training according to employment level, we have been offering “Green Engineering” training aimed at all types of engineers in Japan since 2000, and are working to systematically upgrade this program.

Objective/Plan	Promotional Measures/Achievement
<ul style="list-style-type: none"> <li>● Implement education to promote improved environmental awareness and knowledge among employees (general training: 2,270 people; expert training: 1,460 people in Japan in fiscal year 2000).</li> </ul>	<ul style="list-style-type: none"> <li>● Implemented environmental training in Japan with general training for 1,650 participants and expert training for 1,439 participants.</li> <li>● Offered “Green Engineering” training courses for engineers in Japan. 84 individuals completed the course.</li> </ul>

### 1. Environmental Training System

We conduct environmental training on both a general and expert level. General training is provided at all employment levels, from newly hired staff to executives, and focuses on knowledge of environmental problems and the measures Sharp is taking to deal with them. Expert training emphasizes hands-on experience and acquiring the requisite knowledge appropriate for each job. In the future, we plan to implement distance learning for all employees, taking advantage of corporate intranets and other communications media.

### 2. “Green Engineering” Training in Japan

We have launched “Green Engineering” training with the goal of educating engineers to acquire expert knowledge on laws, regulations and technologies related to the environment. In the first year, we offered a Green Product Basic Course. In addition to lectures on the latest technical trends such as waste plastic recycling technologies and LCA (Life Cycle Assessment), the training involved group discussions on what future “green” products would be like.

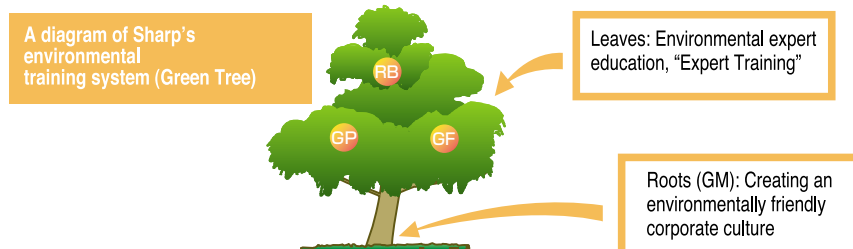
In the future, we will offer expert training with hands-on courses on green products, green factories and green devices, aiming at developing recycling-friendly designs, based on practical training in disassembly and dismantling at recycling facilities.



“Green Engineering” training

#### Training content and number of participants

Level	Type	Summary	Fiscal year 1999	Fiscal year 2000
General	Training for new employees	Understanding how to approach environmental issues and raising environmental awareness	235	254
	Training for new managers	Understanding how to approach environmental issues and look at them from a manager’s perspective	12	24
	Training for experienced managers on environmental issues	Held in each Sharp site in Japan, this is a general course about environmental matters and how Sharp approaches them	1,607	1,372
Expert	Training for employees assigned abroad	Training for employees assigned abroad, emphasizing environmental laws and regulations in the destination country and Sharp’s environmental strategies	56	27
	Training for sales and servicing employees	Employees of sales and servicing companies receive training on complying with laws and regulations necessary to conduct business, such as the Home Appliance Recycling Law, Green Purchasing Law, etc.	996	1,328
	“Green Engineering” training	Familiarizing engineers with environmental laws and regulations, and environmental-related technologies, and educating environmental leaders at the departmental level	—	84



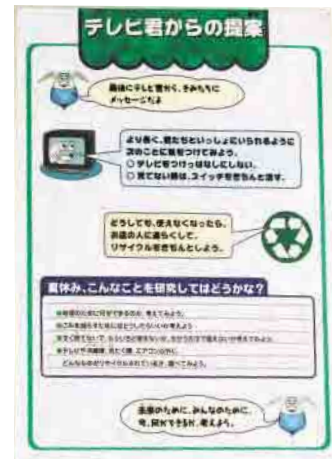
### 3. Environmental Education

#### Environmental education for elementary and junior high school students at Kansai Recycling Systems Co., Ltd.

We are using the recycling plant at Kansai Recycling Systems Co., Ltd. as an educational facility targeting elementary and junior high school students. Our goal is to provide them with an understanding of environmental issues. In coordination with the local City of

Hirakata Education Committee, we are pushing for the development and implementation of environmental education programs that incorporate tours of the facility by students from the city.

At the facility, students will witness the disassembling of used home appliances, as well as the sorting and recovery of usable resources. They will also receive easy-to-understand explanations of current environmental problems such as resource conservation, garbage disposal and the like.



Explanatory panel

## II. Green Mind Campaign

In 1998, we launched a “Green Mind Campaign” to raise environmental awareness among employees and to promote participation by all employees in activities to preserve the environment. We enlisted our Human Resources Group, Environmental Protection Group, and labor unions to coordinate and promote this endeavor, and are working aggressively to implement joint labor/management activities.

#### Objective/Plan

- Aim to improve environmental protection awareness, and contribute to the community while implementing environmental activities.

#### Promotional Measures/Achievement

- Implemented environmental civic action programs at all Japanese business locations during June. This included awareness activities such as environmental poster and slogan contests in Japan.

### 1. Small Group Activities to Reduce Environmental Impact

Sharp has been involved in small group activities since 1991. Called “Creative Action Teams” (CATS), these groups have focused on improving product quality. Since 2000, they have also taken up the challenge of working for a better environment.

Successful efforts and accomplishments during 2000 were announced at the 19th annual company-wide CATS Conference. A team from the Communications Systems Group and the Production Technology Development Group won the highest award for tackling the theme of “development of test equipment to measure mechanical shock effects when opening and closing folding mobile phones.”



Announcement at CATS Conference

### 2. Environmental Slogan and Poster Contests

As one way of generating increased involvement, we invited company employees to submit environmental slogans and posted the best three chosen from among those submitted in all facilities and offices throughout Japan. At the same time, we also asked people both inside and outside of Japan to submit designs for environmental posters, and we displayed the winners in all our business locations. We also printed them on the paper cups dispensed by vending machines within the company as another way of boosting environmental awareness among employees. We received a total of 1,367 submissions for the slogan and poster contests.



Environmental awareness posters and slogans



### 3. Community Environmental Activities

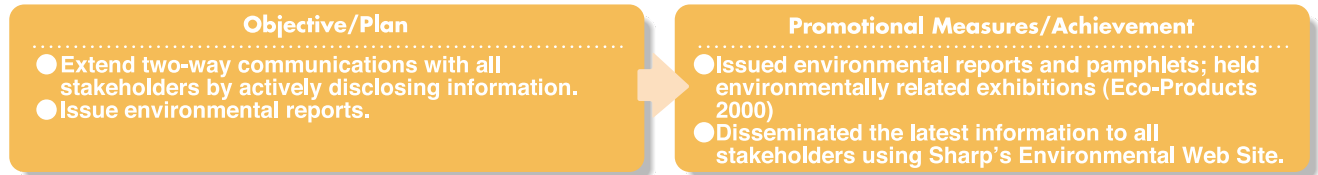
All of our business locations in Japan are sponsoring regular cleanup campaigns in their local areas, focusing on roads receiving heavy commuter use. At our Nara facilities, June was declared “environment promotion month,” and employees collected 23 bags of cans and bottles, as well as 22 bags of non-burnable trash. Also in June, at our Hiroshima facilities, some 80 employees participated in a Litter Pick-Up Campaign sponsored by the City of East Hiroshima, to remove trash and litter in the area around city hall and the train station.



Cleanup campaign around the Hirano Building (Osaka City)

### III. Disclosure and Communications

Enhancing the disclosure and communication of environmentally related information is an extremely important activity. We are working to advance the availability of information in our activities through a dialog with interested parties. By taking advantage of a variety of platforms and mechanisms (environmental reports, Web pages, questionnaires, surveys and the like) we intend to actively make such information available to the general public, while at the same time soliciting public views, opinions and desires with regard to these issues.



#### 1. Information Disclosure

##### Environmental reports and pamphlets

Each year since 1999, we have published an Environmental Report. In fiscal year 2000, this report was issued in three versions, Japanese, English and Chinese.

We also publish an environmental pamphlet whose content is an easy-to-understand, condensed version of the material contained in the full Environmental Report. These publications are widely distributed to the general public, primarily through exhibitions and trade shows. A report on Sharp's North American facilities is also available through the Sharp USA Web site.



2000 Environmental Report

##### Environmental activities Web site

We have set up a series of Web pages related to our environmental activities on Sharp's corporate Web site. Internet visitors can view the contents of our Environmental Report, and access information on the latest environmental topics and environmentally conscious products.



Sharp's Environmental Web Site

#### 2. Information Gathering through an Environmental Monitoring Survey

In October 2000, Sharp launched an Environmental Monitoring Survey to directly track new consumer trends, as well as to obtain environmentally related opinions in Japan. In fiscal year 2000, we conducted 3 surveys in Japan. The first two focused on knowledge of the Japanese Home Appliance Recycling Law and took place in October and November of last year. The other survey, which we titled "Effective Methods to Convey Information Related to the Environmental Friendliness of Products," took place in December. The results of the survey were provided to all our business groups through company-wide environmental meetings and other channels.

#### 3. Environmental Exhibition

##### Eco-Products 2000

At the Eco-Products 2000 exhibition held in Tokyo in December 2000, we included an exhibit on environmentally conscious products and business activities under the theme of "Things That Work for the 21st Century," offering new ideas for lifestyles in this new century. We will continue these exhibitions in 2001.



LCD Digital New Life display booth

##### Mie Environmental Fair

In April 2000, we participated in the First Annual Mie Environmental Fair sponsored by Mie Prefecture in Japan. We mounted a display on the energy-saving benefits of LCD TVs, which was viewed by more than 50,000 visitors.



Display booth at the Mie Environmental Fair

##### Ecomesse Chiba 2000

Sharp was also a key participant in Ecomesse Chiba 2000, an event held every year since 1996 at "Makuhari New City" in Chiba Prefecture. Employee volunteers run the show. The event serves as a venue for announcing environmental activities that bring together private enterprise, citizens and government. At the 2000 event, held in October, Sharp demonstrated our residential photovoltaic power generation systems, using the power generated to supply part of the electricity needs of the main exhibition hall.



Residential photovoltaic system exhibit

A photovoltaic power generation system provided electrical power for the event

# Environmentally Conscious Distribution

## I. Environmental Activities at Distribution Sites

Sharp is committed to preventing global warming by promoting policies such as more efficient modes of transport for the distribution of components, parts and other items.

### Objective/Plan

- Use JR (Japan Railway) containerized transport, average 200 units (measured in 5-ton container load equivalents) per month during fiscal year 2000.
- Stop vehicle idling (turn off engines) while waiting at the premises of Sharp sites in Japan.

### Promotional Measures/Achievement

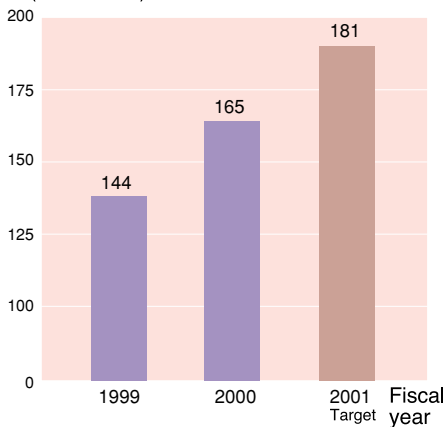
- Monthly JR containerized transport average: 165 units.
- Reduced CO<sub>2</sub> emissions by 66 tons/month by turning off engines while waiting in Japan.

### 1. Changing Modes of Transport

A thorough review of our shipping methods is currently driving a shift away from truck freight and toward railroad container shipping. In fiscal year 2000, we shipped an average of 165 container loads by rail per month, reducing CO<sub>2</sub> emissions by 69 tons, a 32.7% improvement over the previous year. At Sharp's East Japan Logistics Center (located in the City of Higashi Hiroshima), approximately 30% of total shipments are being switched to rail transport, an increase of 92.3% over the previous year on a rail container basis.

#### Railway container shipments (monthly average)

(Containers)



Loading a Japan Railway (JR) container

### 2. Eliminating Engine Idling

Sharp has almost entirely eliminated engine idling by putting stickers at front counters and in vehicles to encourage drivers to turn off their engines when waiting at Sharp sites in Japan, and by using placards and bulletin boards to call attention to drivers. As a result, we have reduced CO<sub>2</sub> emissions by the equivalent of approximately 66 tons per month.\*

\* Compared to continuous idling for an average two-hour wait at a distribution site.



"Idling Prohibited" placard

### 3. Introducing Low-Pollution Vehicles

At distribution centers in Japan, Sharp is replacing engine-driven forklifts with battery-powered models that can use night-generated power when CO<sub>2</sub> emissions are low, and has already converted 250 forklift units to battery power. We are also encouraging our shipping contractors to switch their trucks to low-pollution vehicles, and they have already introduced two 4-ton transport models.



Battery-charging station

### 4. Reducing Waste

#### Reducing buffer materials

Sharp is switching to re-usable airbags, particularly for import/export container shipping. As a result, we have reduced the use of cardboard by 13 tons/month and the use of expanded polystyrene by 91 m<sup>3</sup> per month.



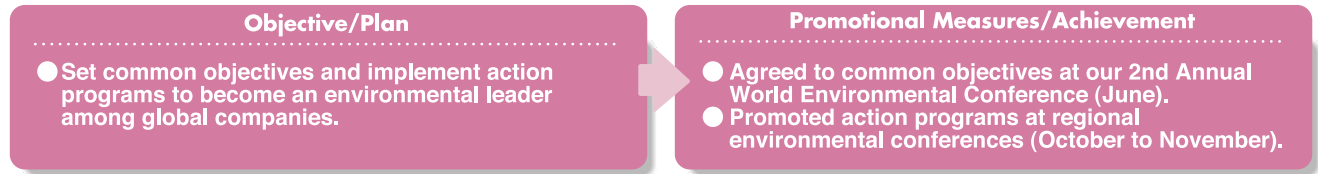
Airbag used for shipping

#### Reducing packaging materials

At Sharp's East Japan Logistics Center, Hiroshima office, we are working to reduce consumption of packaging materials by reusing old product packing cases instead of buying new ones.

# Activities at Overseas Sites

As a global enterprise, our overseas companies are also involved in environmental activities, actively promoting environmental awareness among employees and working to make a contribution to their local and regional communities.



## 1. Global Environmental Conference

Sharp's 2nd Global Environmental Conference was held over two days—June 23 and 24, 2000—with some 70 participants.

### Major themes

We moved toward adopting common themes to promote projects such as creating an organization to develop environmentally conscious products, prevent global warming and reduce waste. Representatives from 18 of our operations (2 in Japan and 16 outside of Japan) made presentations on topics such as environmental laws and regulations in various countries, the latest environmental technologies, environmental action programs and more.

### Decisions adopted

- Apply Green Product Guidelines
- Adopt lead-free solder
- Implement a voluntary action plan for green factories
  - Reduce CO<sub>2</sub> emissions by 2% annually per unit of production (20% reduction by 2010)
  - Reduce total amount of waste generated by 2% annually (10% reduction by 2005)
- Complete acquisition of ISO 14001 certification
  - Push the six production facilities that have not yet been certified to acquire certification during fiscal year 2001, and complete certification for key sales subsidiaries in Europe, North America and Australia.

### Issues and future timetable

One unresolved problem regarding future information disclosure measures is ensuring database compatibility for environmental information such as chemical substance management (including our international bases), environmental statistics, etc. This issue will be dealt with at the next conference, scheduled for June of 2002.

## 2. Regional Environmental Conferences

To follow up on action plans adopted at the Global Environmental Conference and strengthen communications between regions, regional environmental conferences were held in four key areas around the world.

Region	Date	Location	Number of Participants
Pan-American Environmental Conference	18 Oct.	San Francisco	10 from 5 bases
Pan-Europe Environmental Conference	3 Nov.	SEES Spain facility	20 from 12 bases
ASEAN Environmental Conference	13 Nov.	SATL Thailand facility	30 from 15 bases
China Environmental Conference	9 Nov.	Shanghai, China General Representative Office	18 from 9 bases



Presentation at Global Environmental Conference

## 3. Regional Action Programs

### North American action programs Earth Day environmental event (U.S.A.: SEC)

At Sharp Electronics Corporation (SEC), our U.S. sales subsidiary, a variety of events were held in conjunction with Earth Day (celebrated every April 22nd). Employees participated in a cleanup project on the Ramapo River and a tree-planting campaign is underway on company campuses (four locations, including SMCA\* and SEC headquarters). SEC also ran a contest for families of employees, inviting them to submit drawings for an environmental calendar. The completed calendar was distributed to employees.

\* SMCA: Sharp Manufacturing Corporation of America is headquartered in Memphis, Tennessee, and produces TVs and microwave ovens. Please see the Sharp USA Web site <http://www.sharp-usa.com> for complete details on all of the environmental activities of Sharp's North American facilities.



"Save the Forest" calendar

### Cooperating in recycling projects (Connecticut and Minnesota)

Sharp is cooperating by providing funding for experimental projects implemented by the governments of Connecticut and Minnesota to collect and recycle end-of-life electronic products from households across these states.

### European Action Programs

#### Acquiring ISO 14001 certification

During fiscal year 2000, our key European sales sites—SEEG (Germany), SUK (United Kingdom) and SEN (Sweden)—acquired ISO 14001 certification. This is in addition to our production sites and laboratories that have already gained certification. In the future, we plan to also study the joint acquisition of certification by our smaller sales sites in Europe.

#### Joint dealer acquisition of ISO 14001 certification (Northern Europe: SEN)

Sharp Electronics (Nordic), AB, (SEN), our sales site that coordinates activities in northern Europe, is studying joint acquisition of an environmental management system designed to improve the environmental performance of dealers in this region. This system will set uniform environmental goals between SEN and dealers, and reduce environment impact using common performance indicators. SEN's initial goal was to have at least half of its clients acquire certification by the end of 2002, but it is accelerating plans for dealers that handle large numbers of Sharp products, and expects many of these dealers to acquire certification by the fall of 2001.

#### Creating resource-conserving products (United Kingdom: SUKM)

Sharp Manufacturing Company of the U.K. (SUKM), the manufacturing division of SUK, which produces VCRs and microwave ovens, is working to minimize resource use in products and eliminate the use of expanded polystyrene packaging. All packaging in our 2000 line-up, except for some microwave models, was switched to molded pulp materials. In February of 2000, a German consumer product-evaluation magazine, Stiftung Warentest, gave a high rating to the low stand-by power consumption of SUKM's VC-ME80GM VCR.

### Action Programs in the ASEAN Region and China

#### Acquiring the Green Label (Thailand: SATL)

In 1994, all models of air conditioners and refrigerators produced by Sharp Appliances (Thailand) Ltd. (SATL), our manufacturing site in Thailand, were awarded the Green Label—a mark jointly initiated by manufacturers, product standardization laboratories and non-profit environmental organizations in Thailand. In 2000, 22 new SATL-made refrigerator products also acquired the label.



Green Label



Green Label certificate acquired by SATL

#### Environmental awareness activities (Malaysia: SMM; Hong Kong: SRH)

During May and June 2000, Sharp Manufacturing Corporation (M) Sdn. Bhd. (SMM) in Malaysia held a contest and invited people to share their own "Eco Life Essay Contest" under the theme of "actions that can be taken at home to protect the environment." SMM received 83 entries. Sharp-Roxy Hong Kong Ltd. (SRH) sponsored "Eco Office Contest 2000" from November to January, soliciting examples of how to reduce environmental impact in employee's job areas. From among the 30 individuals in 7 work groups using the group entry forms, the example for "Environmentally Conscious Refrigerator/Air Conditioner Repair and Service Practice" won the top award.



Eco Life Essay Contest (SRH)

#### Contributing to regional cleanup (Malaysia: SMM)

In March 2001, some 60 employees of Sharp Manufacturing Corporation (M) Sdn. Bhd. (SMM) participated in an environmental cleanup campaign in the Punguru swim park in the Batu Pahat district. The waste bins used in the cleanup were donated to the water park.



Environmental cleanup campaign in Punguru



Donated waste bins

#### Commendation for manufacturing plant (China: SOCC)

Sharp Office Equipments (Changshu) Co., Ltd. (SOCC), our copier manufacturing facility in China, established an environmental management system in 1998 and, in March 1999, acquired ISO 14001 certification—the first foreign-affiliated company in Changshu City to do so. These activities received high praise and, in March 2000, the company received a commendation from the Changshu City Environmental Protection Committee.

# Environmental Data by Business Site in Japan

Sharp manufactures a wide range of components. Environmental data for all manufacturing operations in Japan is given below.

## Tochigi Site (Audio-Visual Systems Group)

Our Tochigi operations also encompass 14 manufacturing bases outside of Japan. Together, their primary business activity is to develop, manufacture and market audio-visual products and equipment. The main Tochigi facility is located in the unspoiled environment on the threshold of Nikko National Park. To preserve the natural surroundings and protect this rich environment, environmental protection activities began early with the establishment of a full-time environmental management system in 1994. ISO 14001 certification was acquired in 1996 when the standards were first established. This facility has been promoting activities to prevent global warming and reduce waste, based on a voluntary action plan and achieved zero emissions standards in fiscal year 2000. This group is also making an all-out effort to develop and market environmentally conscious products, such as LCD TVs, with the aim of replacing all CRT picture tubes with environmentally friendly, energy-saving LCDs.



## Yaita City, Tochigi Prefecture

### Atmospheric measurements

Emitting facility	Parameter	Unit	Maximum permissible quantity			Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	Sharp standard	
Boiler	SOx (K value)		< 17.5	< 17.5	< 8.5	0.31
	NOx	ppm	< 250	< 250	< 170	120
	Soot and dust	g/Nm <sup>3</sup>	< 0.3	< 0.3	< 0.1	0.008

### Water quality measurements

Classification	Parameter	Unit	Maximum permissible quantity			Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	Sharp standard	
Parameters affecting the community environment	pH		5.8 to 8.6	5.8 to 8.6	6.0 to 8.0	7.6
	BOD (biochemical oxygen demand)	mg/l	160 (120)	25 (20)	< 10	1.7
	SS (suspended solid)	mg/l	200 (150)	50 (40)	< 15	6.0
	Coliform group count	coliform/ml	< 3000	< 3000	< 100	11

## Yao Site (Appliance Systems Group)

Our Yao plant began operations in 1959. The vicinity around Kyuho-ji where these operations are located now forms the core of a new urban center in the inland Osaka region. Industrial development is progressing centered on the culture and technologies of product making destined to lead the 21st century. A community is also taking shape that will serve as a base for disseminating urban lifestyle and culture information. Our facility, located adjacent to a Water Environment Preservation Center, is actively pursuing programs aimed specifically at protecting the environment. Against such a background, the facility strives to make products to support this new century of health and the environment, and is involved in the design, development and manufacture of electric home appliances, including refrigerators, cooking appliances, air conditioners and washing machines.



## Yao City, Osaka

### Atmospheric measurements

Emitting facility	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	Sharp standard	
Boiler (gas mono fuel)	SOx (K value)	Nm <sup>3</sup> /h	0.6	0.6	—	—	(see note)
	NOx	ppm	150	150	—	80	40
	Soot and dust	g/Nm <sup>3</sup>	0.05	0.05	—	0.015	0.005

Note: City gas 13A (natural gas), the fuel used, does not contain a sulfurous component.

### Water quality measurements

Classification	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	Sharp standard	
Parameters affecting the community environment	pH	—	5.7 to 8.7	—	5.7 to 8.7	6.1 to 7.9	6.5 to 7.7
	BOD (biochemical oxygen demand)	mg/L	300	—	300	150	99
	SS (suspended solid)	mg/L	300	—	300	150	71
	N-hexane extractives (mineral oil)	mg/L	5	—	5	3	2.5
	N-hexane extractives (vegetable oil)	mg/L	30	—	30	10	7.0
	Zinc	mg/L	5	—	5	2.5	1.0

Note: Regulated under the Sewerage Law



## Hiroshima Sites

(Communications Systems Group/  
Audio Systems Division,  
Audio-Visual Systems Group)

Our Hiroshima operations are located in Higashi Hiroshima, a city blessed with an abundance of clean air and fresh water. This facility is involved in the development and manufacture of advanced communications devices and systems, as well as audio equipment. It acquired ISO 14001 certification in 1995, one of the first Sharp operations to do so, and has remained committed to protecting the environment ever since. In October 2000, an installation to turn organic sludge from sewage digestion tanks into fertilizer became operational. The recycled fertilizer is being applied to trees and landscaping on the plant grounds. Such waste reduction efforts are continuing on an ongoing basis, and this facility is expected to achieve zero waste emissions by the end of fiscal year 2001. This facility is also making a concerted effort to reduce power consumption and save energy, by taking such measures as installing power meters on every floor to verify the amount of power used by PCs in each department.



## Higashi Hiroshima City, Hiroshima Prefecture

### Atmospheric measurements

Emitting facility	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	Sharp standard	
Boiler (gas mono fuel)	SOx (K value)	Nm <sup>3</sup> /h	4	—	1.38	1	0.08
	NOx	ppm	180	—	135	120	76
	Soot and dust	g/Nm <sup>3</sup>	0.30	—	0.15	0.06	0.01

### Water quality measurements

Classification	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	Sharp standard	
Parameters affecting the community environment	pH	—	5.8 to 8.6	5.8 to 8.6	6.5 to 8.5	6.5 to 8.5	6.7
	SS (suspended solid)	mg/L	200	90	10	10	9.5
	COD (chemical oxygen demand)	mg/L	160	50	15	15	14.2
	BOD (biochemical oxygen demand)	mg/L	160	160	5	5	4.9
	Nitrogen	mg/L	120	120	60	60	42.7
	Phosphorus	mg/L	16	16	8	8	7.90
	Coliform group count	coliform/ml	3,000	3,000	3,000	1,000	35

Note: Regulated under the Sewerage Law

## Nara Sites

(Information Systems Group/  
Digital Document Systems Group/  
Duty Liquid Crystal Display Group)

Our Nara operations are located in the Kita Yamato area of the Nara basin, which forms a scenic natural environment steeped in history. The area includes numerous places of natural beauty and historical interest, including Mt. Kasuga, which is still cloaked in virgin forest, as well as shrines and temples, and the ruins of the ancient capital and its castle, which were registered as a World Heritage Site in 1998. This facility was established in 1960, and is shared by several Sharp business units with different production systems and target markets. Important products include manufactured items such as LCD panels and electronic components that have a direct environmental impact when they are produced, as well as products such as PCs, printers and copiers that exert an indirect impact on the environment once they appear on the market. All employees are involved in activities to reduce to the greatest extent possible the burden on the environment generated by our business activities, as well as to minimize the environmental impact from products entering the marketplace.



## Yamato-Koriyama City, Nara Prefecture

### Atmospheric measurements

Emitting facility	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	Sharp standard	
Boiler (fuel oil)	SOx (K value)		17.5	17.5	17.5	14.5	0.13
	NOx	ppm	180	180	180	80	130
	Soot and dust	mg/Nm <sup>3</sup>	100	100	150	50	24

### Water quality measurements

Classification	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	Sharp standard	
Parameters affecting the community environment	pH		5.8 to 8.6	5.8 to 8.6	5.8 to 8.6	6.0 to 8.4	6.0 to 8.4
	COD (chemical oxygen demand)	mg/l	25 (20)	25 (20)	25 (20)	20	20
	BOD (biochemical oxygen demand)	mg/l	25 (20)	25 (20)	25 (20)	20	5
	SS (suspended solid)	mg/l	90 (70)	90 (70)	90 (70)	20	2
	Fluorine	mg/l	15	15	15	5	5
	Nitrogen	mg/l	120 (60)	120 (60)	120 (60)	60	14
	Phosphorus	mg/l	16 (8)	16 (8)	16 (8)	8	1
	Coliform group count	coliform/l	3,000	3,000	3,000	2,500	22
	Dissolved iron	mg/l	10	10	10	3	0.31
	Dissolved manganese	mg/l	10	10	10	1	0.55

Note: The concentrations of the following substances were all below detectable limits (essentially not detected): N-hexane extractives (mineral oil, animal fat and vegetable oil), phenols, copper, zinc, total chromium, cadmium and compounds thereof, lead and compounds thereof, cyano compounds, organic phosphorus compounds, hexavalent chromium compounds, alkyl mercury compounds, 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 and selenium.

## Shinjo Site (Electronic Components Group)

Our Shinjo operations are located in the middle area of Nara Prefecture, situated against the backdrop of the Kongo and Katsuragi mountain ranges. Production activities began in 1981. This facility develops and manufactures photovoltaic cells/modules, a source of clean energy and one of the premier products for which Sharp is known. Photovoltaic cells are used as a source of electrical power for unmanned lighthouses and in remote rural areas. Photovoltaic cells arrays are also mounted on Earth-orbiting satellites and are a key component in residential photovoltaic power systems, which are growing rapidly in popularity. This facility encourages environmentally conscious activities, giving priority to the four points below:

1. Design for compatibility with a resource-recycling society from the earliest product design stage.
2. Eliminate toxic substances in products and promote "green" procurement.
3. Promote energy conservation in manufacturing, introduce energy-efficient production equipment, and institute action programs to achieve zero emissions by fiscal year 2001.
4. Continuously improve environmental management according to ISO 14001 standards (certification acquired in 1996).



## Kita-Katsuragi Township, Nara Prefecture

### Atmospheric measurements

Emitting facility	Parameter	Unit	Maximum permissible quantity			Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	Sharp standard	
Boiler (gas mono fuel)	NOx	ppm	150	—	98	56
	Soot and dust	mg/Nm <sup>3</sup>	100	—	12	2.1

### Water quality measurements

Classification	Parameter	Unit	Maximum permissible quantity			Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	Sharp standard	
Parameters affecting the community environment	pH		5.8 to 8.6	5.8 to 8.6	6.0 to 8.0	7.0
	COD (chemical oxygen demand)	mg/l	160 (120)	10	8	2.8
	Phosphorus	mg/l	15	15	7	3.6
	Nitrogen	mg/l	120 (60)	120 (60)	60	4.6
	Coliform group count	coliform/ml	(3,000)	(3,000)	10	5
	Dissolved iron	mg/l	10	10	2	0.023
	BOD (biochemical oxygen demand)	mg/l	160	25	19	10

Note: The concentrations of the following substances were all below detectable limits (essentially not detected): SS (suspended solids), phosphorus, N-hexane extractives, phenols, copper, zinc, dissolved manganese, cadmium, cyanide compounds, organic phosphorus compounds, lead, hexavalent chromium compounds, arsenic, total mercury, alkyl mercury, PCBs, trichloroethylene, tetrachloroethylene, dichloromethane, carbon tetrachloride, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene, 1,3-dichloropropene, thiuram, simazine (CAT), thiobencarb, benzene and selenium.

## Fukuyama Site (Integrated Circuits Group)

Our Fukuyama operations are located in Fukuyama City in the southeast part of Hiroshima Prefecture, on the border with Okayama Prefecture near the Seto Inland Sea. This facility has been fabricating logic and memory ICs since 1985 and acquired ISO 14001 certification in 1996. Management and personnel are constantly working to upgrade environmental management systems, and are engaged in a series of projects aimed at earning "green factory" designation, including energy conservation, solid waste reduction, and minimizing the use of toxic chemical substances. The staff is also involved in ongoing efforts to reduce the energy consumption of both production equipment and air conditioning systems in the plant. These activities are expected to lead the achievement of zero emissions by fiscal year 2001 based on measures such as the biological treatment of spent developer solution. This facility is also taking up the challenge of reducing the use of toxic chemicals by locating and utilizing appropriate substitutes.



## Fukuyama City, Hiroshima Prefecture

### Atmospheric measurements

Emitting facility	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	Sharp standard	
Boiler (gas mono fuel)	SOx (K value)	ppb	—	—	< 3	< 0.05	0.043
			2.23	—	< 1.75	< 0.029	0.025
	NOx	ppm	< 150	—	< 100	< 100	83
	Soot and dust	mg/Nm <sup>3</sup>	< 100	—	< 50	< 5	2.3
	Fluorine and its compounds	mg/Nm <sup>3</sup>	—	< 2.5	< 1.25	< 0.625	Undetectable
Sulfuric acid	mg/Nm <sup>3</sup>	—	< 10.0	< 5.0	< 2.5	0.08	

### Water quality measurements

Classification	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	Sharp standard	
Parameters affecting the community environment	pH		5.0 to 9.0 (ocean areas)	5.5 to 9.0	5.8 to 8.6	6.0 to 8.4	6.9 to 7.0
	COD (chemical oxygen demand)	mg/L	160 (120)	15	15 (10)	10	3.2
	Fluorine	mg/L	15	15 (10)	15 (10)	10	5.3
	SS (suspended solid)	mg/L	200 (150)	200 (150)	20 (10)	10	3
	Nitrogen	mg/L	120 (60)	120 (60)	—	60	21
	Phosphorus	mg/L	16 (8)	16 (8)	—	8	0.11
	Coliform group count	coliform/ml	(3,000)	(3,000)	—	1,500 (domestic wastewater)	0
	Zinc	mg/L	5	5	—	2.5	0.02

Note: The concentrations of the following substances were all below detectable limits (essentially not detected): N-hexane extractives, phenols, copper, dissolved iron, dissolved manganese, total chromium, cadmium and compounds thereof, cyanide compounds, organic phosphorus compounds, lead and compounds thereof, hexavalent chromium compounds, arsenic and compounds thereof, total mercury, alkyl mercury, 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-dichloropropene, thiuram, simazine, thiobencarb, benzene and selenium.

## Mie Site (TFT Liquid Crystal Display Group)

Our Mie operations are located on the outskirts of Matsusaka City near the clean-flowing Kushida River that traverses the Ise Plain. Plant No. 1 began production in October 1995, and Plant No. 2 became fully operational in August 2000. These facilities supply LCD displays for a wide variety of 21st century information devices by taking advantage of highly automated computer network systems and leading-edge ultra-fine-line photolithography techniques. The goal of this facility's environmental action programs is to preserve and protect the global and local environment. They include actively introducing energy-efficient production equipment, and recovering and recycling process effluent. These environmental efforts won the MITI Director-General's Award with an Outstanding Environmental Equipment Commendation from the Japan Society of Industrial Machinery Manufacturers in June 1997; the Recycling Promotion Conference Chairman's Award as a Recycling Promoter of Merit in October 1999; and the Japan Water Prize for promoting healthy rivers and streams from the Japan River Association in May 2001.



## Taki Township, Mie Prefecture

### Atmospheric measurements

Emitting facility	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	Sharp standard	
Boiler (gas mono fuel)	NOx	ppm	150		100	75	66
	Soot and dust	mg/h	100	—	50	40	1

### Water quality measurements

Classification	Parameter	Unit	Maximum permissible quantity				Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	By agreement (municipal)	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	6.6 to 7.3
	BOD (biochemical oxygen demand)	mg/l	160	20	10	1.8	1.2
	COD (chemical oxygen demand)	mg/l	160	20	10	3.1	1.5
	Coliform group count	coliform/ml	3,000	3,000	3,000	0	0
	Nitrogen	mg/l	120	—	5	3.1	2.5

Note: The concentrations of the following substances were all below detectable limits (essentially not detected): SS (suspended solid), N-hexane extractives (mineral oil) and fluorine.

## Tenri Sites

(TFT Liquid Crystal Display Group/  
Integrated Circuits Group/  
Corporate Research and Development Group/  
Production Technology Development Group)

Our Tenri facilities are located in the Kita Yamato area of Nara Prefecture, and began operation in April 1970 as a strategic site to consolidate the research, development and manufacturing of leading-edge technologies, which form the core of our business activities. Since then, these operations have brought forth a succession of innovative technologies and products, including opto-devices, ICs, solar cells and LCDs. It currently serves as a key base in Japan for the production of TFT LCDs and ICs. In an effort to encourage a close relationship between the environment and local communities, as well as move toward a recycling-oriented society, all employees are involved in a variety of action programs. These include building highly efficient, energy-conserving design and development systems from a life-cycle viewpoint, recovering and reusing process effluent, reducing solid waste and promoting recycling activities. This facility expects to achieve zero emissions for solid waste in fiscal year 2001. In 2002, a natural gas pipeline will be laid at the site, enabling this clean-burning source of energy to be used in a high-efficiency co-generation system, which will be built for the facility. This project will promote further energy savings and reductions in atmospheric emissions.



## Tenri City, Nara Prefecture

### Atmospheric measurements

Emitting facility	Parameter	Unit	Maximum permissible quantity			Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	Sharp standard	
Boiler (type A heavy oil, fuel oil)	SOx	Nm <sup>3</sup> /h	10.59	10.59	0.7	0.3359
	NOx	ppm	180	180	120	74
	Soot and dust	mg/Nm <sup>3</sup>	250	250	50	30

### Water quality measurements

Classification	Parameter	Unit	Maximum permissible quantity (max. daily average value)			Fiscal year 2000 measured value (max.)
			Laws (national)	Regulatory (prefecture)	Sharp standard	
Parameters affecting the community environment	pH		5.8 to 8.6	5.8 to 8.6	6.0 to 8.0	6.9
	BOD (biochemical oxygen demand)	mg/l	25 (20)	25 (20)	18	14
	COD (chemical oxygen demand)	mg/l	20	20	18	12
	Phosphorus	mg/l	15	15	10	6.0
	Nitrogen	mg/l	120 (60)	120 (60)	110 (50)	36
	SS (suspended solid)	mg/l	90 (70)	90 (70)	25	11
	Copper	mg/l	3	3	1	0.022
	Zinc	mg/l	5	5	2	0.045
	Dissolved iron	mg/l	10	10	2	0.092
	Dissolved manganese	mg/l	10	10	0.5	0.01
	Total phosphorus	mg/l	16 (8)	16 (8)	3	1.5
	Coliform group count	coliform/ml	(3000)	(3000)	1,000	660

Note: The concentrations of the following substances were all below detectable limits (essentially not detected): N-hexane extractives (mineral oil), phenols, cadmium and compounds thereof, cyanide compounds, organic phosphorus compounds, lead compounds, hexavalent chromium compounds, arsenic compounds, mercury and/or alkyl mercury compounds, PCBs, dichloromethane, carbon tetrachloride, 1,2-dichloroethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, tetrachloroethylene, 1,3-dichloropropene, thiuram, simazine (CAT), thiobencarb, benzene and selenium.

# Environmental History and Awards

## History

### Environmental Activities Over the Years

1971	Established the Environmental Technology Center	1995	Revised the Product Assessment Guidelines
1979	Established the First Synthetic Energy Committee	1996	Started an all-company effort to create Green Products
1987	Established the CFC Regulation Countermeasure Committee	1997	Completed of ISO 14001 Certification acquisition at all domestic manufacturing sites
1991	Appointed the Corporate Director for Environmental Management		Conducted a Global Environmental Conference
	Established the Environmental Activities Promotion Department	1998	Established the Environmental Protection Group
1992	Enacted the SHARP Environmental Charter and Basic Environmental Conservation Guidelines		Began the Environmental "3G-1R Strategy"
1993	Established the First Environmental Strategy Conference	1999	Green Products Guidelines published
	Announced the Voluntary Plan on Environment		Sharp Green Seal system introduced
	Began registration of persons in charge of environmental conservation for overseas operations	1999	Green Mind Campaign started
1994	Phased out ozone-depleting chemicals in the cleansing process of all operations	1999	Environmental Report published
	Phased out vinyl chloride in all packaging		Kansai Recycling Systems Co., Ltd. established
	Established the C-PA (Chemical Product Assessment) system	2000	Trial introduction of the Environmental Accounting System
			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
		2001	Issued "Green Factory Guidelines"
			Launched "Green Engineering" training
			Started "Super Green Campaign"

## Awards

### Sites

Jun. 1995	<b>Tenri LCD Group, Tenri, Nara</b> • IPA (isopropyl alcohol) recovery and refinement, The 21st Ministry of International Trade and Industry Award for Excellent Environmental Equipment.
Oct. 1995	<b>ALL SHARP</b> • 1995 US Environmental Protection Agency Stratospheric Ozone Protection Award
Dec. 1995	<b>Sharp-Roxy Appliances Corporation (M) Sdn. Bhd. (SRAC), Selangor, Malaysia</b> • Malaysia Ozone Layer Protection Award
Apr. 1996	<b>Sharp Manufacturing Company of U.K. (SUKM), North Wales, U.K.</b> • UK Styrofoam Recycling Award
Jun. 1997	<b>Electronic Components Group, Shinjo, Nara</b> • 1997 Environmental Protection Distinguished Service Award for Global Warming Prevention from the Environmental Agency
Jun. 1997	<b>TFT LCD Group, Tenri, Mie</b> • DMSO (dimethyl sulpho oxide) Contaminated Waste Water Recovery and Reuse System. The 23rd Ministry of International Trade and Industry Award for Excellent Environmental Equipment.
Oct. 1997	<b>Fukuyama IC Group, Fukuyama, Hiroshima</b> • Chairman's Award from The Recycling Promotion Association, Japan
Dec. 1997	<b>Sharp Electronics Taiwan (SET), Kaohsiung, Taiwan</b> • 1998 Industrial Waste Recycling Activity Grand Prize from the Economy Management Bureau
Jan. 1998	<b>Sharp Thebnakorn Manufacturing (Thailand) (STTM), Nakornchaisri, Thailand</b> • 1997 Excellent Environmental All Factory Award
Mar. 1998	<b>Sharp Office Equipments (Changshu) Co., Ltd. (SOCC), Chang Shu, China</b> • 1997 Chang Shu City Advanced Environmental Protection Company
Oct. 1998	<b>TFT LCD Group, Tenri, Nara</b> • Chairman Award of The Recycle Promotion Association, Japan
Oct. 1999	<b>Fukuyama IC Group, Fukuyama, Hiroshima</b> • Recycling Promotion Achievement Award, Ministry of International Trade and Industry Prize, from Recycling Promotion Association
Oct. 1999	<b>TFT LCD Group, Mie Plant</b> • Recycling Promotion Achievement Award, Chairman's Prize, from Recycling Promotion Association
Dec. 1999	<b>Sharp Electronics (Taiwan) Co., Ltd. (SET)</b> • Award for Environmentally Conscious Companies • Silver Award for Recycling Activities
Feb. 2000	<b>ALL SHARP</b> • Special Company Award for Energy Savings

### Environmental Education

Jul. 1997	Sharp Microelectronics Technology, Inc. (SMT), Washington, US • Excellent Environmental Award from the Association of Washington Business (AWB), Education Division
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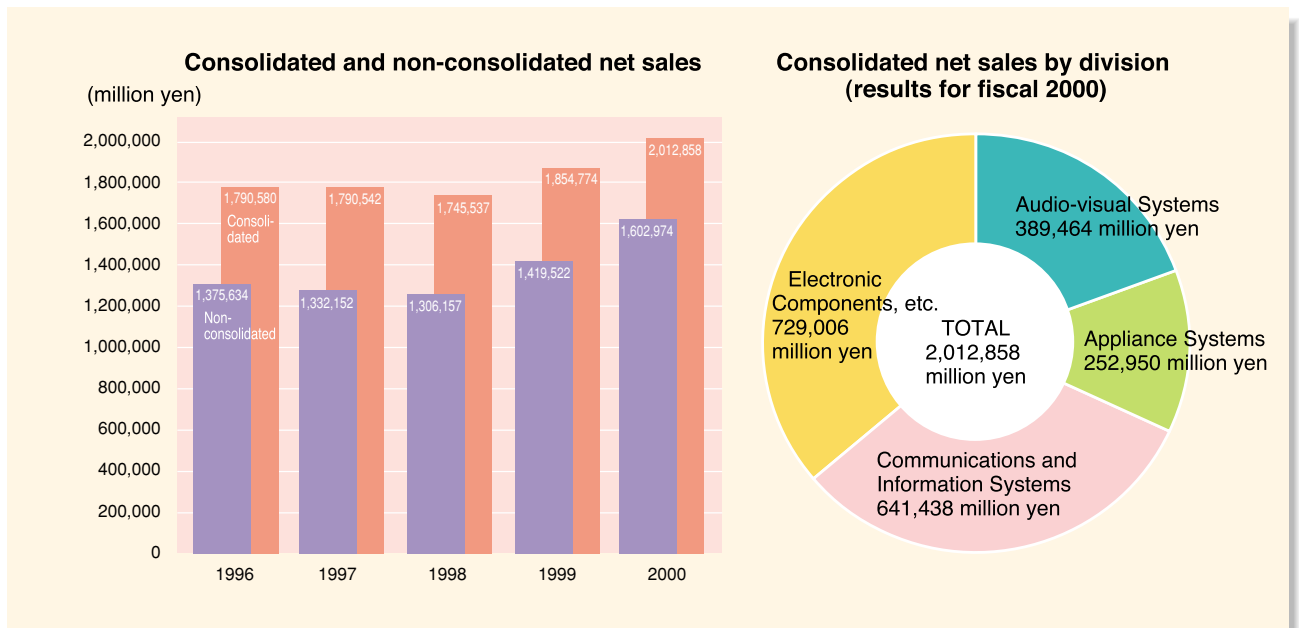
### Products

Feb. 1994	<b>Fully Automatic Washer</b> • Commendation from the Director General of the Agency of National Resources and Energy in the 1993 Energy Conservation Vanguard 21
Feb. 1996	<b>Electric Refrigerator</b> • Commendation from the Chairman of the Energy Conservation Center in the 1995 Energy Conservation Vanguard 21
Jan. 1997	<b>Solar-Powered Generator for Home Use</b> • Commendation from the Director General of the Agency of National Resources and Energy in the 1996 Energy Conservation Vanguard 21
Jan. 1997	<b>Electric Carpet</b> • Commendation from the Chairman of the Energy Conservation Center in the 1996 Energy Conservation Vanguard 21
Jan. 1997	<b>Refrigerator</b> • Commendation from the Director General of the Agency of National Resources and Energy in the 1996 Energy Conservation Vanguard 21
Nov. 1997	<b>Vacuum Insulation Technology</b> • 1997 US Environmental Protection Agency Stratospheric Ozone Protection Award
Jan. 1998	<b>Fully Automatic Washer</b> • Commendation from the Minister of International Trade and Industry in the 1997 Energy Conservation Vanguard 21
Feb. 1998	<b>Solar-Powered Generator for Home Use</b> • Commendation from the Director General of the Agency of National Resources and Energy in the 1997 Energy Conservation Vanguard 21.
Feb. 1999	<b>LCD Navigation Microwave Oven / Super Mobile LCD, Low Energy Switching Power Device</b> • Commendation from the Chairman of the Energy Conservation Center in the 1998 Energy Conservation Awards.
Feb. 1999	<b>200 kW Photovoltaic Generator with Snow Melting Function</b> • Commendation from the Minister of International Trade and Industry in the 1998 New Energy Awards
Feb. 1999	<b>Photovoltaic Generator for Home Use</b> • Commendation from the Chairman of the New Energy Foundation in the 1998 New Energy Awards
Jan. 2000	<b>Refrigerator (made at Shanghai Sharp Electronics Co., Ltd. (SSEC))</b> • Ozone Protection Award from China's Environmental Protection Agency
Feb. 2000	<b>20-inch LCD TV</b> • Commendation from the Chairman of the Energy Conservation Center in the 1999 Energy Conservation Awards
Feb. 2000	<b>Refrigerator</b> • Commendation from the Chairman of the Energy Conservation Center in the 1999 Energy Conservation Awards
Feb. 2000	<b>Environment-Friendly Housing Complexes Equipped with Photovoltaic Power Generation System</b> • Commendation from the minister of International Trade and Industry in the 1999 New Energy Awards
Nov. 2000	<b>Non-volatile memory cell read-out circuit logic</b> • 2000 Kinki Regional Invention Prize
Feb. 2001	<b>Refrigerator/freezer</b> • Commendation from the Chairman of the Energy Conservation Center in the 2000 Energy Conservation Awards
Feb. 2001	<b>Photovoltaic System for Home Use</b> • Commendation from the Chairman of the New Energy Foundation in the 2000 New Energy Awards

# 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 offices: 67 in 28 countries  
 Operations: Manufacture and sales of audio and visual  
 products, home appliances, information and  
 communications products, electronic  
 components, etc.

Employees: 49,101 (30,862 in Japan,  
 18,239 in rest of world)  
 \* As of March 31, 2001, for Sharp  
 Corporation and consolidated subsidiaries  
 Capital Stock: ¥204 billion(rounded to nearest  
 ¥1 billion)  
 \*As of March 31, 2001



## Main businesses

Electronics Products		Electronic Components
<p><b>Audio-Visual Systems</b>            Color televisions, HDTV, LCD color televisions, video-TVs, LCD projectors, digital broadcast receivers, DVD players, LCD ViewCams, VCRs, digital still cameras, MD players, CD radio cassette recorders, CD Stereo DVD/MD pickups</p> <p><b>Appliance Systems</b>            Refrigerators, microwave ovens, air conditioners, washing machines drum-type washer-dryers, vacuum cleaners, oil heaters, electric heaters, CCD cameras, network control units, air purifiers dehumidifiers, small cooking instruments</p>	<p><b>Communications and Information Systems</b>            Facsimiles, telephone sets, mobile phones, PHS Phones, PCs, Japanese-language word processors, personal information tools, electronic dictionaries, electronic calculators, POS system terminals, handy terminals, electronic cash registers, workstations, color LCD monitors, application software, digital copying machines, electrostatic copying machines, computer peripherals including color inkjet printers and color image scanners, consumables for copiers, printers and multi-function machines, FA equipment, CAD systems, ultrasonic cleaning systems</p>	<p>Electronic tuners, high frequency and infrared transmission units, parts for satellite broadcasting, semiconductor lasers, hologram lasers, opto-electronic devices, voltage regulators, switching power supplies, photovoltaic cell/module, EL display modules, LEDs, flash memory, combination memory CCD/CMOS, image sensors, ICs for LCDs, analog ICs, microcomputers, TFT LCD modules, passive matrix LCD modules</p>

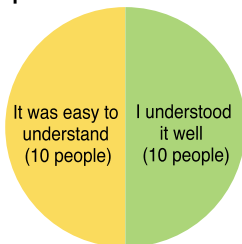
## Editorial Policy

- (1) This report places emphasis on providing a clear picture of Sharp's philosophy and activities aimed at achieving a "sustainable society." In addition to issues that Sharp is heavily involved, such as the development of environmentally conscious products, reducing energy consumption and waste, and reducing the use of and managing chemical substances, we have given priority to themes that have a high degree of community interest such as recycling.
- (2) Published material was prepared with reference to Environmental Reporting Guidelines (2000 Edition) and Environmental Performance Indicators for Businesses (Fiscal Year 2000 Version) published by Japan's Environment Agency in February, 2001. In addition, reference was made to the Sustainability Guidelines of the Global Reporting Initiative (GRI), and worldwide movement. Sharp is aware that, in the future, its environmentally related activities and information disclosure need to be further strengthened.
- (3) The overall structure is arranged along six environmental action stages that Sharp is involved in. Emphasis was placed on communicating in an easy-to-understand manner information related to Sharp's environmental activities not only to environmental experts, but also to users of our products, residents in the vicinity of our business operations, customers, NGOs, students and other interested parties at the broadest level.
- (4) To improve readability and make browsing this document easier, the "Table of Contents" page and pages containing the "Main Objectives and Level of Achievement in Fiscal Year 2000" are color-coded for each of the six stages.

## Fiscal year 2000 Environmental Report Questionnaire Results

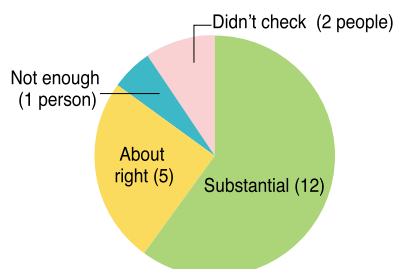
The editors solicited opinions from 20 Japanese readers of last year's Environmental Report. We are extremely grateful for their kind cooperation. Here, we present their views, and indicate areas of improvement in this year's report reflecting their suggestions.

### Q1: What did you think about this report?



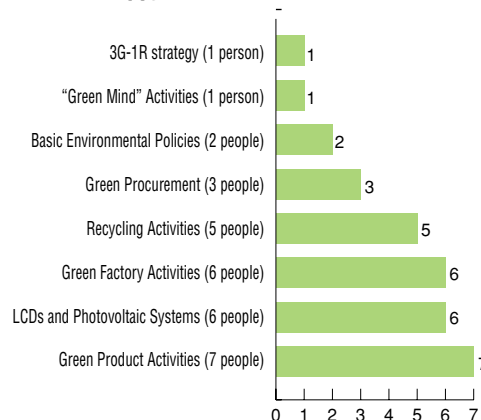
- ◆ Please give us your opinion, and tell us how we can improve it.
    - Overall, the layout is good. The essentials that seemed necessary were there, and were easy to understand. It felt like careful consideration was given to the reader.
    - Environmental activities were compiled under individual themes, and the goals and results, progress status, etc., were expressed in an easy-to-understand manner.
- ⇒ For the fiscal year 2001 version, we have again covered all our activity themes, and compiled information for each theme in an easy-to-understand manner.

### Q2: What did you think about the information content?



- ◆ Please give us your opinion, and tell us how we can improve it.
    - Not enough about environmental action programs classified by region and factory.
- ⇒ We included the section, "Environment Data by Business Site."
- The goals of future action programs were difficult to understand.
- ⇒ We included a side-bar on "Goals and Plans" for each theme.
- If you went more into depth on your action programs for solar cells and TFT LCDs, it would make the report more enjoyable to read.
- ⇒ We included a Special Feature section.
- There's a lot of data, and it's easy to understand.
  - The explanations of the charts and figures are easy to understand.
  - The descriptions of products designed to reduce the burden on the environment provided much useful information.

### Q3: Which section impressed you most?



- ◆ Please give us your opinion.
    - Environmental consciousness in design and development was extremely easy to understand.
    - The amounts of materials handled under the PRTR were expressed in an easy-to-understand way.
- ### Q4: What is your overall opinion of our report and environmental activities?
- ◆ Please give us your opinion, and tell us how we can improve it.
    - Don't you feel there is a need for third-party certification?
- ⇒ Sharp's opinion on this matter is included at the end of this report.
- The questionnaire needs a space where people can freely express their written opinions and comments.
- ⇒ We've included a space where people can write whatever they want.
- I wish you would have described how you dealt with LCA assessment procedures.
- ⇒ We've expanded the section on the status of our LCA activities.

- ### Q5: What would you like to see from Sharp in the future?
- I would like to see more aggressive PR about activities in which Sharp leads other companies.
  - Sharp should further expand its LCD and photovoltaic systems businesses, and through these business activities, work to reduce the burden on the environment.
  - As the leading manufacturer of LCDs, Sharp should promote reduced energy consumption by using LCDs as well as the wider use of photovoltaic systems.
  - Develop environmentally conscious products.

# SHARP

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