

About This Report Sony published its first environmental report in December 1994. The aim was to build a broader understanding of the various environmental initiatives promoted by the Sony Group worldwide. This second report focuses chiefly on the Group's activities in 1996. We discuss many of the issues the company has faced, as well as our hopes and plans for the future. We believe this will provide our readers with a better appreciation of Sony's commitment to the environment and the actions we are taking to fulfill this commitment. Although the date for the next report is undecided, we intend each year to make public the latest figures concerning the environmental impact of the Group's operations.

(For general information about Sony's business activities and financial performance, please refer to the company's latest annual report)

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- 6. **ACTION** The "Digital Dream Kids" concept calls for Sony to be a "total entertainment company." This drive hinges on the company's strengths in the development and production of electronic products. Electronics is a cornerstone of the Sony Group—as well as an area which has a potentially large impact on the environment. This section covers three main manufacturing-related topics:
 - **The environmental impact of Sony products**
 - **The environmental impact of production processes**
 - **The promotion of recycling activities**
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- 12. **Striking an Environmental Balance in Production**
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- 20. **GLOBAL ACTIVITIES** In addition to corporate functions in Japan, Sony has established regional environmental centers in North America, Europe, and Asia. Through this infrastructure, the company engages in conservation activities on a global scale. This section highlights the different issues facing the Group in each region, and how the Group is taking on these issues.
- 24. **SONY PEOPLE** Realizing that all its employees share responsibility for the proper stewardship of the earth, Sony provides the support they need to be effective. This section looks at the Group's educational programs and support systems, as well as some of the contributions of Sony people worldwide to improving society and the ecology.
- 28. **DATA** How Sony gathers environmental data concerning its operations worldwide. Some of the latest figures are contained in the back pocket of this report.

Corporate Profile

Head Office: 6-7-35, Kita-Shinagawa, Shinagawa-ku
Tokyo 141, Japan

Established: May 1946

Employees in Group: 159,991 (consolidated, as of September 30, 1996)

Consolidated Financial Highlights

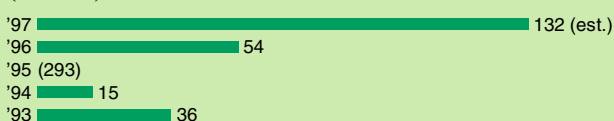
Sales and Operating Revenue

(¥ billions)



Net Income (Loss)

(¥ billions)



A Message From the Management



Only One Earth for the Future

When I was a child, the earth seemed infinitely wide. It was full of wonder and beauty. There is a phrase in classical Japanese to represent the ideal coastal scene: “white sand, green pines.” That describes perfectly the place where I grew up. Rolling white sand dunes spread out in front of my home. I could see the brilliant blue ocean on the far side of a cluster of tall pine trees. Today, construction has sprung up all along the shore. The dunes and the pines are gone. The view from my home has been lost forever.

Pine trees are disappearing rapidly throughout Japan. This is not simply due to some sort of blight. Aggressive industrialization both in Japan and in neighboring countries are also to blame. Such development spouts pollution into the air, which is then carried to all parts of Japan.

Europe faces a similar problem. I have seen how pollution from countries pursuing rapid industrial development has carved a broad swath of dead trees from the Czech Republic to Germany. I was horrified to find huge tracts of land in Europe covered with nothing but stumps. People talk excitedly about the shrinking global village. Unfortunately, this kind of border-spanning pollution is a sad reminder that the world is indeed a small place.

It is also irreplaceable. It pains me to think about whether we will be able to pass on to our children—and our children’s children—a planet worth living in.

We are seeking to make consideration for environmental protection a fundamental part of all Sony business activities. But one company alone cannot change the world. I call upon the entire electronics industry and people, businesses and governments around the world to combine their knowledge and resourcefulness to overcome the critical environmental problems we now face. We must work together to succeed.

I hope this report will provide you with insights regarding Sony’s role in protecting the environment and the actions we are taking to fulfill this role.

April 1997

A handwritten signature in black ink, appearing to read "Norio Ohga". The signature is fluid and cursive, written over a light blue background.

Norio Ohga
Chairman of the Board and Chief Executive Officer



Protecting the Environment for a New Millennium

With its growing emphasis on producing films, TV programming and music titles, Sony is quickly evolving into a total entertainment company. However, our traditional expertise lies in the area of manufacturing audio and video products for both home and professional use. In fact, manufacturing remains the cornerstone of our company, and we currently introduce from 7,000 to 8,000 new items every year.

As a leading manufacturer of electronics products, I believe Sony must do all we can to minimize any potentially negative impact on the environment. This is true for both the products we manufacture, as well as the processes we use in making them. Furthermore, we must consider ways to recycle our products in order to conserve scant materials and resources.

The establishment in 1990 of an Environmental Conservation Committee at Sony Corporation marks our total commitment to protecting the environment. We started both the Greenplus Project and the Sony Environmental Award scheme in 1994. Through these and other projects, we have created a comprehensive framework for the promotion of environmentally friendly production systems. Our R&D and product

planning operations now include a deep awareness of environmental issues.

We are developing a similar environmental management framework for Sony companies worldwide, based on ISO-14001 guidelines. We are focusing on concrete measures with quantifiable targets for emission prevention, waste reduction and energy conservation, to name a few. In this way, we hope to contribute to the protection of the environment and preserve it for a new millennium.

This report discusses in some detail the steps we are taking to protect and preserve the environment. I hope it will help you to gain a better understanding of our commitment to this very important issue.

April 1997

A handwritten signature in black ink, appearing to read 'Nobuyuki Idei'. The signature is fluid and stylized, with a long horizontal line extending to the right.

Nobuyuki Idei
President and Chief Operating Officer

Environmental Organization

Sony's commitment to the environment spans the globe. Environmental Conservation Committees (ECCs) in Japan, North America, Europe and Asia are constantly striving to identify the problems facing their regions and devise responses that can be implemented easily and efficiently. The various business units in the Sony Group also pursue environmental programs tailored to specific offices or product areas. Together, the ECCs and the business units engage in a wide range of initiatives to conserve and protect the environment on a global scale.

Environmental Conservation Committees

Reflecting the thinking of the corporate executive board, the Sony ECC in Japan ultimately determines the environmental-response measures of Sony operations around the world. This body drafted the Global Environmental Policy, for example, and directs the planning, proposal and implementation of various systems and policies to guide the entire Sony Group.

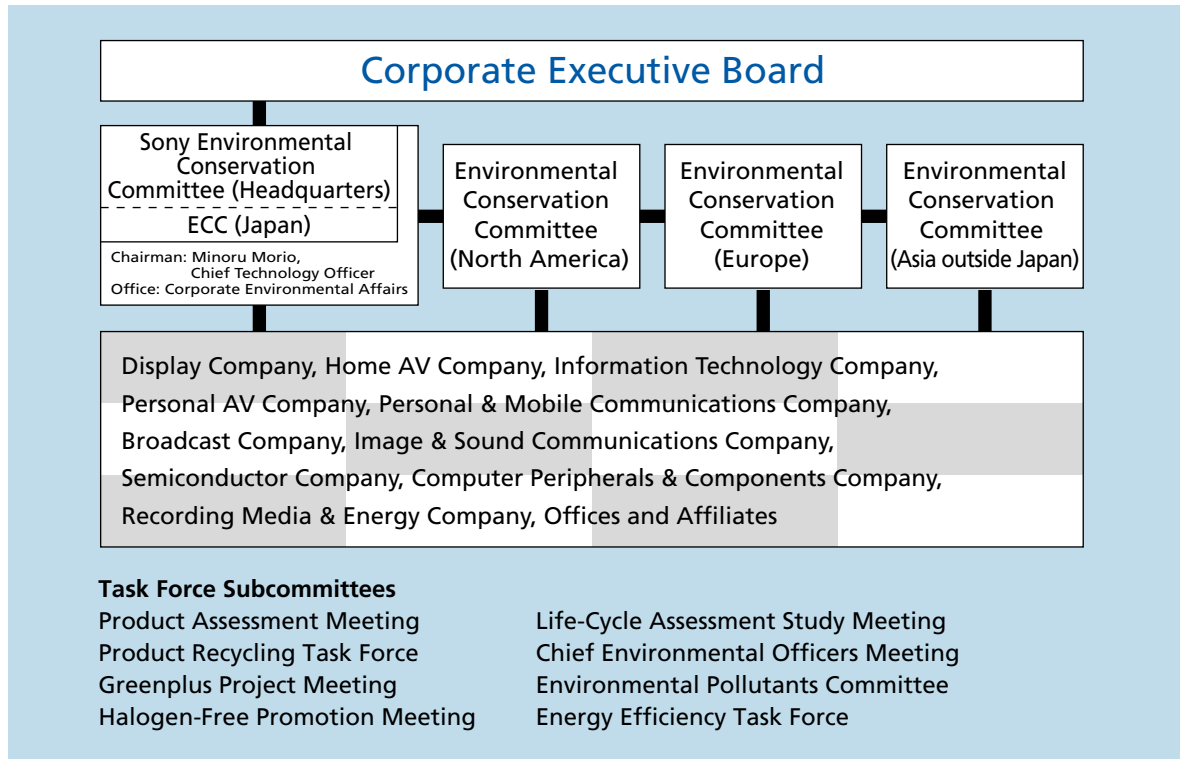
Both in Japan and overseas, ECCs are well acquainted with the issues confronting their regions and the particular demands of their markets. They also have a firm grasp of local regulations. Drawing on this knowledge, each ECC works with Group offices and affiliates within its region to conduct local environmental programs. Moreover, individual offices and affiliates devise their own environmental goals and projects. With the support of the ECCs, these bases thus work from specific guidelines covering all offices, plants, subsidiaries and product areas.

Environmental Conferences

Every year, the four regional ECCs each hold an Environmental Conference. These meetings bring together the environmental representatives of regional offices and affiliates as well as committee members from other regions. Attendees review the year's activities and draw up future action plans. The gatherings also provide a valuable forum for the exchange of information. The company's chief environmental officers attend the conference in Japan. Among other things, they evaluate common global policy and issue corporate directives to mold the Group's environmental activities.

Task Force Subcommittees

The Corporate Environmental Affairs office regularly holds a variety of task force subcommittee meetings. The purpose of these gatherings is to look more closely into certain issues concerning the environment and develop more detailed objectives and action plans. Complete minutes of these meetings are sent to the overseas Environmental Conservation Committees.



ZATION ORGANIZATION



A Sony Environmental Conference, held at the head office in December 1996

Highlights of Environmental Activities

- | | | |
|----------|------|---|
| April | 1976 | The Environmental Conference is formed, chaired by the president. |
| May | 1976 | The Environmental Science Center is established. Hazardous waste materials and working environments of Group operations in Japan are evaluated (see page 12). |
| April | 1985 | Sony Corporation of America begins environmental audits. |
| March | 1989 | A special committee is convened to study measures to eliminate the use of chlorofluorocarbons (CFCs). |
| August | 1990 | The President's Policy on the Environment is disseminated among corporate staff. |
| October | 1990 | The Environmental Conservation Committee organization is initiated. |
| November | 1991 | Sony signs the Business Charter for Sustainable Development of the International Chamber of Commerce. |
| April | 1993 | Global Environmental Policy is established and implemented. CFC cleaning agents are eliminated from all production processes of the Sony Group worldwide. |
| February | 1994 | The Sony Environmental Award program is launched (see page 25). |
| May | 1994 | The Greenplus Project is launched (see page 8). |
| July | 1994 | Guidelines for achieving environmental ISO certification are established. |
| May | 1995 | Sony Kohda Corporation becomes the first company in the Sony Group to attain ISO-14001 certification. |
| October | 1996 | The Sony Environmental Action Plan is revised. The Green Management 2000 program is established. |
| February | 1997 | The number of Group companies with ISO-14001 certification exceeds 30. |

Action

The Global Environmental Policy applies wherever the Sony Group is active in the world. To follow through with this policy, the four Environmental Conservation Committees have drawn up their own Environmental Action Plans. Reflecting the unique concerns and conditions of each region, these plans offer concrete guidance to support local Group operations.

Japan

Green Management 2000

In October 1996, Group companies in Japan entered the second stage of the domestic action plan, called Green Management 2000. They are working to meet this stage's objectives by the end of fiscal 2000. Green Management 2000 puts emphasis primarily on the following points:

■ ISO-14001 Certification

All production facilities in Japan will obtain ISO-14001 certification by March 1998. Non-production facilities will achieve this goal by March 2001.

■ Greenplus 2000

By 2000, all products made by Sony will reflect environmental considerations.

■ Prevention of Global Warming

By conserving energy, developing energy-efficient products, and incorporating "green" energy sources, the Group will dramatically reduce carbon dioxide emissions.

■ Zero Disposal

From 2010 onward, the company will not dispose of any waste in landfills.

■ Product Recycling 2000

All products sold after 2000 will incorporate parts and materials that facilitate easy recycling and reuse.

■ "Green" Purchasing

All purchasing decisions, for materials, parts, facilities and office equipment, will place priority on ecological considerations.

■ Introduction of "Green" Cars

As progress in ultra-low-pollution technology allows, the company will make use of electric cars and other low-pollution vehicles.

■ Upgrading Emergency Response Capabilities

Sony will institute a comprehensive response system to deal with natural emergencies, prevent harm to the environment during a disaster, and enable a swift reaction to crises that affect both the company and the community at large.

■ Green Perspective in Plant Location and Overseas Expansion

Sony will fully take into account a range of environmental issues before building new plants, expanding or launching overseas operations, making any major revisions to the nature of its operations, or withdrawing from a particular field of business.

North America

In 1993, Sony Corporation of America was the first Group member to establish an environmental action plan. The plan contained policy statements and guidelines on how each Sony company should address environmental issues. The action plan was expanded in 1996 with the addition of two guidelines covering "green" purchasing and product stewardship.



Europe and Asia (Outside Japan)

The ECCs in these two regions are in the process of revising their Environmental Action Plans. They are using Japan's Green Management 2000 as a model, tailoring guidelines to suit the particular demands and parameters of their regions.

ISO-14001

The International Organization for Standardization was established to create universal manufacturing standards. New ISO standards were introduced to cover quality assurance management in 1987, sparking moves to develop global standards for all aspects of corporate management as well. The ISO-14001 compact went into effect in September 1996, setting common guidelines for how businesses should address environmental issues. The following month, the Ministry of International Trade and Industry devised JIS standards to support the ISO-14001 movement in Japan.

Targets of Green Management 2000 in Japan

Objectives for Reducing the Environmental Impact of Products

Reuse of Product Materials

- **Recycling.** By 2000, making possible the recycling of 50% of the parts and materials that could not be recycled as of fiscal 1992.
- **Dismantling.** During the ten-year period ending in 2000, cutting in half the time needed to disassemble products to the point where recycling is possible.
- **Styrene Foam.** By 2000, halving the total volume of styrene foam used compared with 1990 levels.

Prevention of Global Warming (Energy Conservation)

- **Major Products Produced.** By 2000, reducing the number of major product types by 30% to 50% compared with the 1990 level.

Objectives for Reducing the Environmental Impact of Production Processes

Prevention of Global Warming (Energy Conservation)

- **Offices.** Compared with 1990 levels, targeting a 25% reduction in the ratio of petroleum-equivalent energy consumption to net sales by 2000.

Industrial Waste

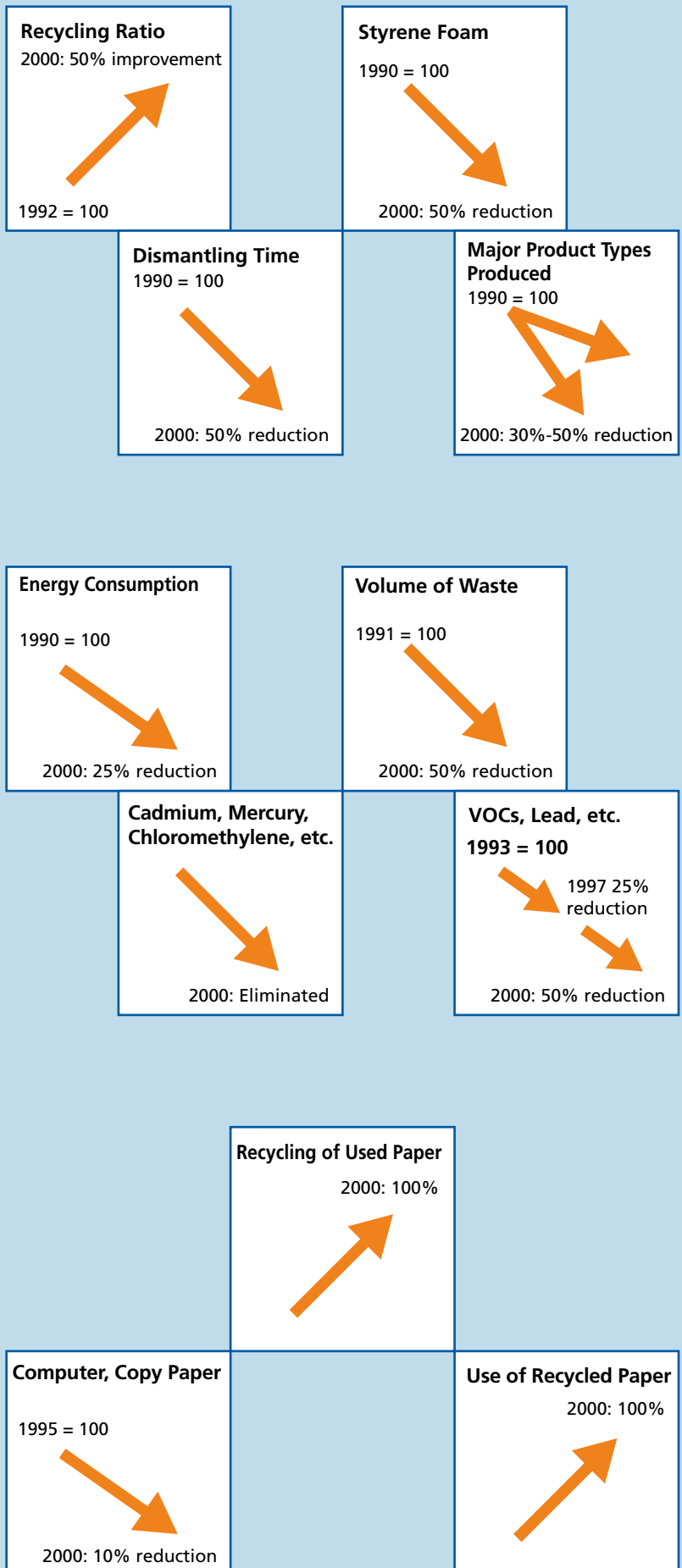
- Lowering the ratio of waste volume to net sales by more than 50% compared with 1991 levels.
- Eliminating landfill use by 2010.

Pollutants From Production Processes

- **Now Prohibited.** Trichloroethylene, CFCs, benzene and other substances are now prohibited.
- **To Be Eliminated.** Cadmium, mercury, chloromethylene, and other substances are to be eliminated by 2000.
- **To Be Reduced.** Compared with 1993 levels, VOCs, lead and other substances are to be reduced 25% by fiscal 1997 and 50% by 2000.
- **To Be Closely Controlled.** Chlorine, ammonia, arsenic and other substances are to be closely controlled in accordance with regulations.

Objectives for Reusing Paper Resources

- By 2000, achieving a 10% reduction in computer and copy paper compared with 1995 levels.
- Recycling 100% of used paper by 2000.
- Using only recycled paper by 2000.





Environmentally Sound Development, Planning and Design

Any product spends most of its life cycle in the hands of a consumer. Knowing this, Sony works to ensure that its products can be used in a manner that is least harmful to the environment. The company also takes into consideration what will happen to a product after it has lost its usefulness and is ready to be disposed of. Well before production begins, Sony addresses these issues through “product assessment,” a process of gauging whether a product satisfies the rigorous environmental objectives set down by the company.

Development

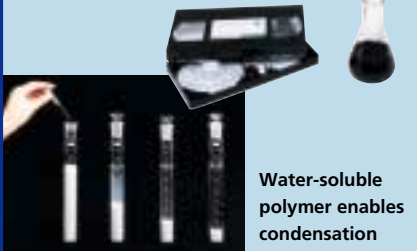
Center for Environmental Technologies
An abiding goal at Sony is to put the company’s considerable technical prowess to work for the protection of the environment. Much of this drive centers around the company’s Center for Environmental Technologies (CET), located within the head-office Sony Research Center.

The CET has already made several key breakthroughs: alternatives to styrene foam such as cardboard and pulp molds, as well as Cellu Mold, a cushioning material made from old paper (see page 10); and a limonene-based system for dissolving styrene foam for reuse (see page 19). Ongoing activities are equally diverse. Research continues into techniques for transforming plastic extracted from home electronics into value-added materials for other applications. Another focus is on a method to collect, purify and re-package high-performance dye from video printer ribbon cartridges.

• Research Topics at the CET
Reuse of Polystyrene Through Chemical Improvement

This technology relies on a process called ‘sulfonation.’ Sulfonation transforms the polystyrene plastic used in VHS cassette shells into a water-soluble polymer. This polymer can then be used as a condensing agent in water-treatment applications. With this technology, it is possible to reuse the plastic from one video cassette to treat up to 65 drums of waste water.

VHS cassette shell → water-soluble polymer



Water-soluble polymer enables condensation

• Research Topics at the CET
Recycling Dye From Video Printer Ink Ribbons

Generally, a sizable amount of high-performance dye remains in the ink ribbons of thermal-transfer video printers after they are used. Sony engineers set out to find an effective and economical way to recover and reuse this dye. They developed automated equipment and a method of extracting the dye from the used ribbon cartridges as well as a means of purifying it, using column chromatography. Re-packaged ribbons using the purified dye were found to be of comparable quality to new ribbons.

Trial dye extraction and collection equipment



Planning

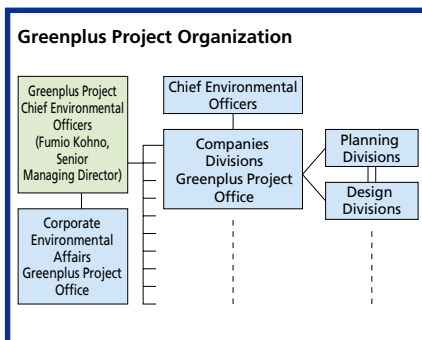
The Greenplus Project for Environmentally Sound Manufacturing

Sony believes its environmental commitment should be evident in the products it makes. Based on this thinking, the company launched the Greenplus Project in April 1994. The immediate goal of the project was to create at least one environmentally sensitive product for every product category in the Sony Group. Today, about 200 such products are in an in-house application process to be recognized as Greenplus products—and half are already on the market.

Having achieved the project’s initial targets in 1996, Sony moved on to the second stage: Greenplus 2000. This stage aims to make every Sony product environmentally sensitive by the year 2000. To support this effort, the company drew up manufacturing guidelines and distributed them to Group firms worldwide. Accompanying the “green” guidelines were explanations of various global and domestic regulations and concrete examples of successful “Greenplus products.” After undergoing a thorough product assessment, all Greenplus products must demonstrate significant improvement in at least one of the following areas.

Greenplus Guidelines

- **Materials with environmental impact**
- **Energy efficiency**
- **Resource conservation**
 - Reduction in resources used
 - Product life cycle
 - Percentage of reusable materials
- **Recycling**
 - Ability to be recycled
 - Labeling of plastic materials
 - Time needed for disassembly
- **Environmental packaging**
- **Benefit to new-product planning**



Examples of Greenplus Products



Only the ribbon itself needs to be replaced in this printing media product.

The KV-28FW2 television is an exemplary Greenplus product: it uses uniform materials, is easy to dismantle, and boasts low power consumption.



The Walkman WM-EX622 and GX622 can play a tape non-stop for up to 50 hours; packaging is made of recycled paper and sugarcane pulp.

Design

Full Product Assessment in All Operations

One of the criteria Sony uses to determine the quality of any product is its environmental soundness. To this end, the company has mandated that all products in categories throughout the Sony Group undergo comprehensive product assessments.

Initially, product assessment (PA) focused on what happened to a product after its disposal. These considerations were then incorporated into design. Particular steps included:

- cutting down on the weight and bulk of products and materials to avoid exhausting resources
 - making the product easy to take apart to facilitate the reuse of materials
 - taking measures against combustion or explosion to ensure safety during recycling
- Today, PA is expanding into a means of ascertaining a product's overall impact on the environment, and of verifying the design steps capable of diminishing this impact.

Related departments in the Sony Group have sought to refine PA methods since the initiative was first introduced under the 1991 Environmental Action Plan. Efforts have gone into studying and improving the selection of environmental design criteria and checking methods, and into finding the best way of applying these criteria to each product category.

The company has PA representatives in the design sections of each product category, as well as in materials and other peripheral groups. They set out environmental objectives, study new technologies, and exchange information at monthly meetings. Task force committees further address specific objectives. Extensive Group-wide communication between representatives ensures greater responsiveness to changes affecting environmental design activities.

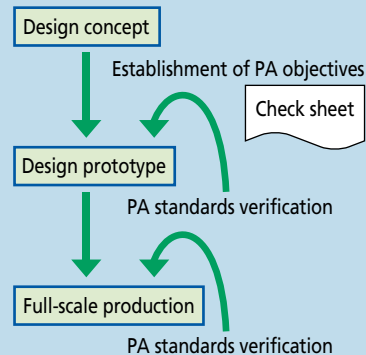
PA representatives in each design section are working to develop product assessment standards tailored to their particular section's

activities. Meanwhile, a top priority has been the creation of company-wide PA guidelines, covering:

- the establishment of design standards to minimize the environmental impact of each product
- verification that the prototype meets these standards
- further verification that these standards are met in full-scale production
- methods of handling the results of verification
- clarification of responsibilities throughout the assessment process

"Ecology is product quality." Based on this belief, Sony's PA drive is building a solid framework for managing every aspect of product design and production—such as lowering resource and energy requirements, using environmentally friendly materials, and simplifying recycling procedures.

Product assessments are carried out during both the prototype and full-scale production stages to ensure that only environmentally sound Sony products reach the market.



A meeting of PA representatives



Design

Reducing Product Energy Requirements

The lion's share of the total sum of energy consumed by an electronics product is consumed during use by the customer. Any effort to decrease its overall environmental impact must take this into consideration in the design stages. As a matter of course, Sony conforms to Japan's Energy Conservation Law and participates in various international voluntary initiatives such as the Energy Star program. Beyond this, the company has also set category-specific goals of halving energy requirements for all products by 2000, compared with 1990 levels. Development of conservation technology to reach these goals is under way. Embodying efforts in this area is a line of longer-recording "Stamina" Handycams, which received the 1996 Chairman's award from the Energy Conservation Vanguard. Other developments during the year include smaller, lighter-weight, energy-saving deflection yokes and the extended-time continuous-play Walkman, as well as optical pickups, semiconductors and other low-energy devices.

Energy-Efficient "Stamina" Handycam Series Recognized

In January 1997, Sony's "Stamina" Handycam series of home camcorders became the first audiovisual product to receive the Chairman's Award from the Energy-Saving Center. The Center is part of the Energy Conservation Vanguard 21 initiative of the Ministry of International Trade and Industry. This organization promotes the development and use of energy-efficient equipment by recognizing outstanding products and technology. The awards were based not only on energy efficiency, but also on advances in packaging materials, ease of recycling, and an array of other standards.



Recycling a Larger Percentage of Products

Looking ahead, it is clear that society must strike a fruitful balance between environmental protection and profitable manufacturing. Enabling recycling to become a viable business field necessitates the implementation of the proper technology, collection functions and other support systems. Products themselves must facilitate easier recycling. Sony is putting priority on more effective end-of-life treatment for its products by incorporating product assessments and recycling considerations as factors in design. To allow a larger percentage of materials to be recovered from its products, the company is working to:

- use recyclable materials and uniform materials
- create structures that are easier to recycle, giving thought to bonding methods, dismantling and disassembly
- incorporate information labels for recycling, i.e. identifying type of plastic or the material used in circuit boards

Improved Assembly/Disassembly

Cutting down the time needed to disassemble products is vital to encouraging recycling. Sony is aggressively pursuing reductions in the number of parts and material types used in its products. Examples of progress in this area include single-battery remote control units, snap-in designs for TV sets, and reductions in the numbers of parts and screws for products. The company has also halved the number of parts in the cassette mechanisms of its car stereos.

Recyclable Paper Packaging: Cellu Mold

Using fewer resources more effectively is an ongoing thrust at Sony. Engineers have come up with several alternative packaging materials to replace styrene foam, including cardboard and molds made from used paper. While broadening applications for these materials, the company is also striving to reduce overall packaging volume.

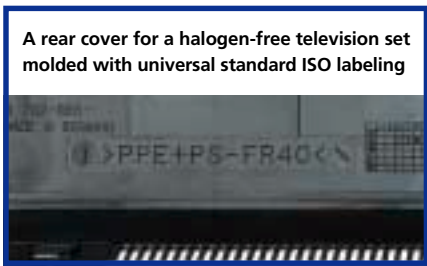
Used-paper pulp molds have been employed since 1991 in packaging for Walkmans, 8mm camcorders and other products. With partner Rengo Co., Ltd., Sony recently made a breakthrough in packaging material for heavier products: Cellu Mold. A compound paper material, Cellu Mold boasts shock-absorption properties equivalent to that of styrene foam. By adding hollow acrylic particles to a base of shredded old paper, engineers found that the material could cushion impacts and be molded with the same ease as styrene foam. Moreover, because it uses natural starch as a binding agent, Cellu Mold can be reused as cushioning material or as recycled paper. The new material is being used in tape recorder packaging; plans call for a much broader application over the next few years.

Cellu Mold is an excellent cushioning and insulation material for home electronics or office equipment.



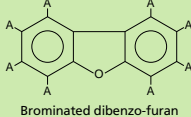
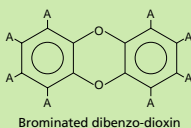
Reducing High Environmental Impact Materials

Materials with high environmental impact include plastics that are difficult to recycle or substances which, through chemical reactions, pose an environmental hazard. Sony has made major strides in eliminating such materials from its products. The company recently developed an external housing and printed circuit board made of halogen-free flame-retardant plastics. These plastics use an advanced process to prevent the formation of toxic dioxin and furan compounds. In Europe, the housing and circuit board were first introduced in a color TV set in 1995, followed by a computer display in 1996. The computer monitors clear Swedish TCO 95 and comply with the German Blue Angel standards. These items also conform to Phase II standards of the German Dioxin Ordinance, which is not scheduled to take effect until July 1999.



Halogen-Free Flame-Retardant Plastics

The chemical structure of conventional bromine-based flame-retardant materials closely resembles that of the toxic compounds dibenzo-dioxin or dibenzo-furan. As a result, the reaction of such materials with dioxin or furan compounds can occur quite easily at high temperatures. Preventing these chemical interactions demands the use of "halogen-free" flame-retardant materials, which contain no chlorine, bromine, fluorine or other halogens.



Design Support

Environmental Product Laboratory

At the 1996 Global Environmental Meeting in Tokyo, Sony decided to expand the Disassembly Evaluation Workshop of the Environmental Center Europe into a comprehensive environmental product laboratory (EPL). Once operational, the lab will measure and gather data on the possible effects of Sony products on human beings and the environment. The EPL will create a uniform format for presenting information on ease of disassembly and recycling, the efficient use of resources, materials traits, power requirements, heat, noise, electromagnetic radiation and other environmentally relevant product attributes.

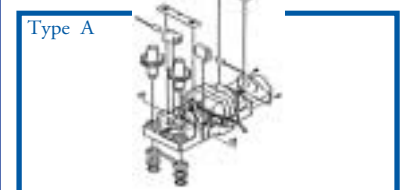
By providing these environmental data sheets, the EPL will play a vital role in supporting the company's product assessment efforts and the Greenplus 2000 initiative. The lab hopes to serve as both an environmental consulting office and training center for Sony development and design engineers worldwide. Over the longer term, the EPL plans to conduct research to support the creation of future ecologically sound Sony products.

Design Tool to Measure Environmental Impact

Sony has a valuable tool to help designers gauge the total environmental impact of a product and evaluate the costs of assembly and disassembly. Called DAC-LCA*, the tool is already used by several business units; others are considering its adoption. Part of assessing environmental impact means creating a standard quantification of the total amount of carbon dioxide generated by a product, from manufacturing through disposal. Assembly/disassembly assessment means quantifying both the ease of product disassembly, thus facilitating recycling, and the ease of assembly, thus lowering costs. DAC-LCA begins providing feedback from the very first stages of development, so new ideas can be quickly incorporated into the final product design.

* DAC = Design for Assembly-Disassembly Cost-Effectiveness; LCA = Life-Cycle Assessment

An example of DAC-LCA assessment of a precision motor



Operation	DAC		LCA	
	Ease of Assembly : Point		Materials - Assembly : Kg	
Base	1	70	1.41	
Motor Assy	1	50	7.78	
Retainer A	1	50	0.06	
Lead	1	50	0.01	
Brush Cover	2	90	0.08	
Brush Cover	2	90	0.01	
Grease	2	70	0.11	
Gear	1	80	0.02	
Grease	2	100	0.04	
Earth	1	70	0.06	
Retainer	1	60	0.15	
Cover	2	60	0.06	
Screw	1	40	0.07	
Retainer	1	50	0.06	
Bearing	1	70	0.02	
Washer	2	70	0.07	
Ring	2	50	0.06	

Operation	DAC		LCA	
	Ease of Disassembly : Point		Disassembly - Scrapping : Kg	
Motor	1	70	0.02	
Ring	2	80	0.03	
Gear	2	90	0.03	
Washer	2	90	0.03	
Bearing	1	80	0.02	
Retainer C	1	80	0.02	
Retainer B	2	90	0.02	
Earth	2	100	0.02	
Brush Cover	2	90	0.03	
Screw	2	60	0.04	
Cover	1	90	0.01	
Retainer A	1	90	0.01	
Motor Assy	1	60	0.03	
Base	1	100	0.01	

TOTAL DAC		TOTAL LCA	
Parts	:19	Materials	: 8.13Kg
Ease of Assembly	:65.9p	Processing	: 1.72Kg
Assembly Times	:100.0%	Assembly	: 0.22Kg
Parts of Disassembly	:19	Disassembly	: 0.09Kg
Ease of Disassembly	:83.6p	Scrapping	: 0.21Kg
Disassembly Times	:100.0	Total	:10.37Kg

Striking an Environmental Balance in Production

All Sony production bases are working to make environmentally sound practices an integral part of their manufacturing operations. The focus is on addressing urgent ecological issues—global warming, loss of the ozone layer, the reduction of waste materials and controlling the release of pollutants into the environment—effectively and systematically. Sony continuously strives to minimize its impact on the environment, such as by creating an internationally consistent environmental management system and obtaining certification from qualified outside agencies.

Environmental Management and Auditing

Sony maintains a stringent auditing system for all environmental matters. Each company in the Sony Group has a dual auditing organization: internal environmental audits and inspections performed by auditors from the Environmental Conservation Committees. Voluntary audits and certifications

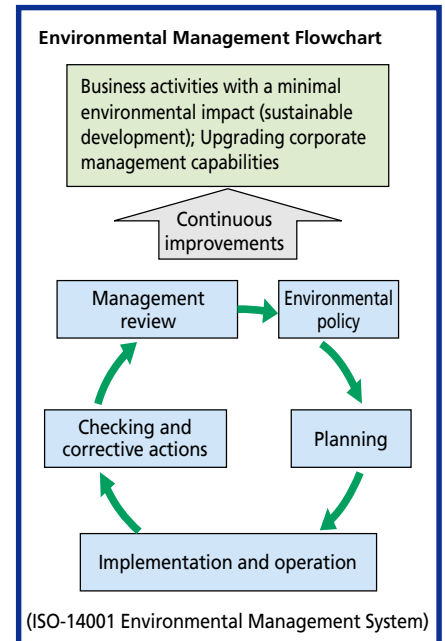
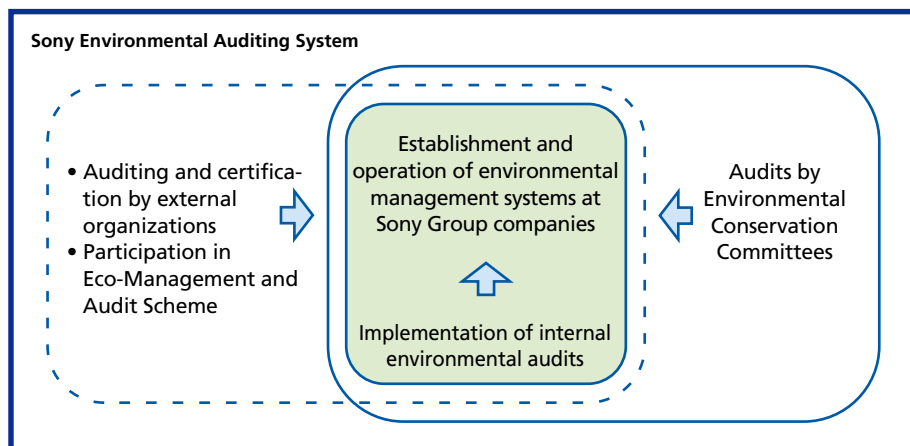
from external organizations add yet another layer to the management system. In 1994 in Japan, Sony with nine other electronics makers and two organizations established Japan Environmental Certification Organization, Inc., a body charged with ensuring compliance with international standards.

Internal Environmental Auditors

Sony's own environmental auditors are at the forefront of the company's drive to sustain the highest standards in internal auditing. Each group company holds periodic seminars to train and certify new auditors. The result is a large and growing base of these specialists: nearly 800 auditors in Japan and 60 overseas, as of March 1997. Instructors from Tokyo regularly visit Sony bases elsewhere in Asia and Europe to share their knowledge of environmental management systems and auditing procedures.

Environmental Management System

Environmental management is an integral element of Sony's global manufacturing operations. All Group members follow a



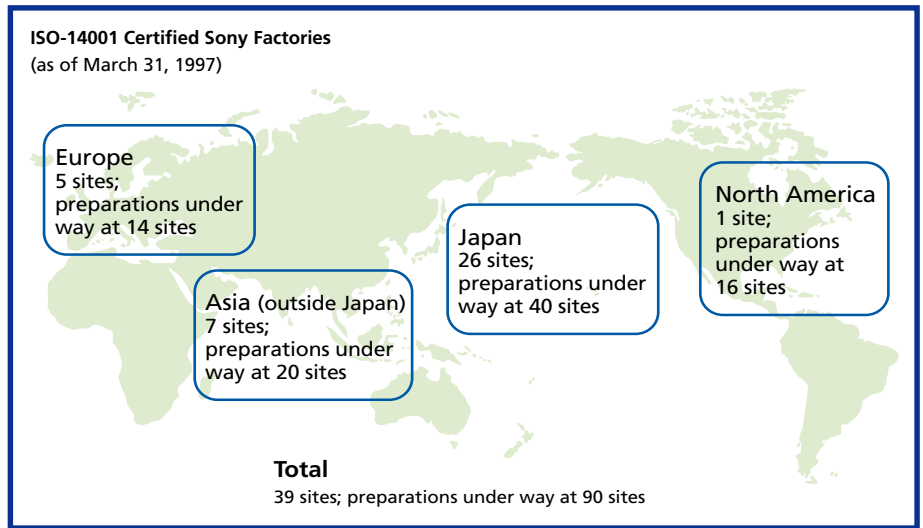
prescribed set of guidelines for environmental issues and certification targets. By linking certified supervision systems with company-wide programs, Sony intends to make continuous improvements in all aspects of environmental management.

Environmental Monitoring Centers

Established in 1976, Group Environmental Monitoring Centers gather data needed to monitor the effectiveness of the company's environmental management programs. Specialists at the centers test water and air quality, various effluents, working conditions and other items.



Environmental Monitoring Center



ISO-14001 Certification

Sony's environmental management system aims for continual improvements in the environmental impact of Group operations around the world. ISO-14001 certification is regarded as essential to achieving this goal. Adherence to these international standards yields a solid base for upgrading measures to deal with waste, conserve energy, minimize the release of pollutants and achieve other objectives. All Sony companies are working toward ISO certification based on the following targets:

- (1) All Group manufacturing bases will obtain ISO-14001 certification by March 1998.
- (2) All non-manufacturing bases will obtain ISO-14001 certification by March 2001.
- (3) All European Union manufacturing bases will obtain ISO-14001 certification by March 1998 or will register to comply with the Eco-Management and Audit Scheme of the EU.

Action Programs by Environmental Objective

Reductions in Industrial Waste

Shrinking the volume of residual materials that must be disposed of is a central theme at all Sony production facilities. This entails cutting down the amount of waste generated, and recycling as many materials as possible. Individual action plans are formulated in accordance with the needs of each facility and host community.

In Japan, waste disposed of per unit of sales has fallen by 30% between fiscal 1991 and 1995. This reflects both a drop in actual volume of waste and an increase in recycling to 54% of waste generated. Among the

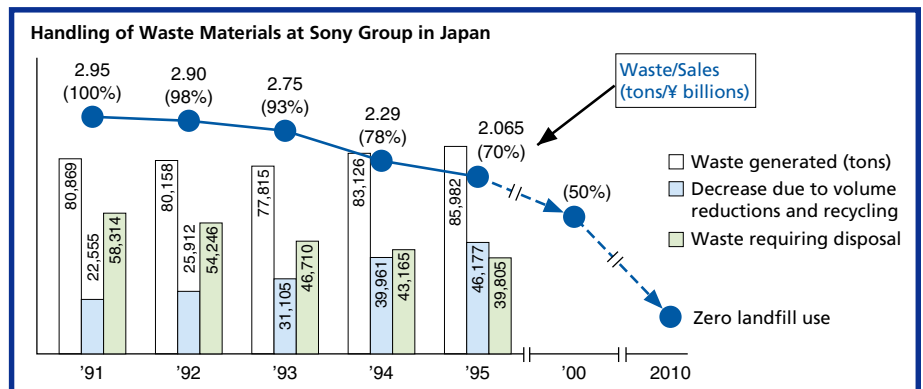
most effective measures were recycling sludge to make cement, making concentrates from waste alkaline substances, and devising ways to reuse packaging materials. By fiscal 2000, Sony plans to cut discarded waste by 50% compared with 1991.

Sony carefully follows the methods used by waste vendors to ensure effective trash disposal. Processing sites and landfills are regularly inspected by company representatives to confirm their compliance with standards. These initiatives, in conjunction with a steady decline in waste generated, form the basis for Sony's goal in Japan of completely eliminating the use of landfills for company refuse by 2010.

The North American Sony Group is implementing its own action plan. By fiscal 2000, the group aims to cut waste per unit of sales by half in relation to fiscal 1993 performance. Recycling is key to this drive. Solvents, glass, printed circuit boards, wood pallets and many other materials are all used repeatedly. In fiscal 1995, group companies in this region had already raised the waste recycling ratio to an impressive 66%.

Sony companies in Europe have formulated an action plan that calls for a 10% reduction in the waste-to-sales ratio as well as a recycling ratio of 65% between fiscal 1995 and 2000. While this may seem low, this target is actually quite challenging in light of the advanced state of environmental programs already in place. For example, 99% of waste solvents are already recycled in Europe. Nevertheless, Sony is determined to make further headway.

The responsible handling of industrial waste is a growing problem in eastern Asia, where manufacturing activity is steadily expanding. As awareness of the problem grows, more companies are adopting ISO-14001-based environmental management practices. Sony facilities continue to make strides in lowering the environmental impact of their activities. The 50% recycling rate for plastic packaging materials is just one illustration of progress in this region. Much more work remains, however. A shortage of incinerators makes the reduction and recycling of waste paper one of several key goals for the years ahead.



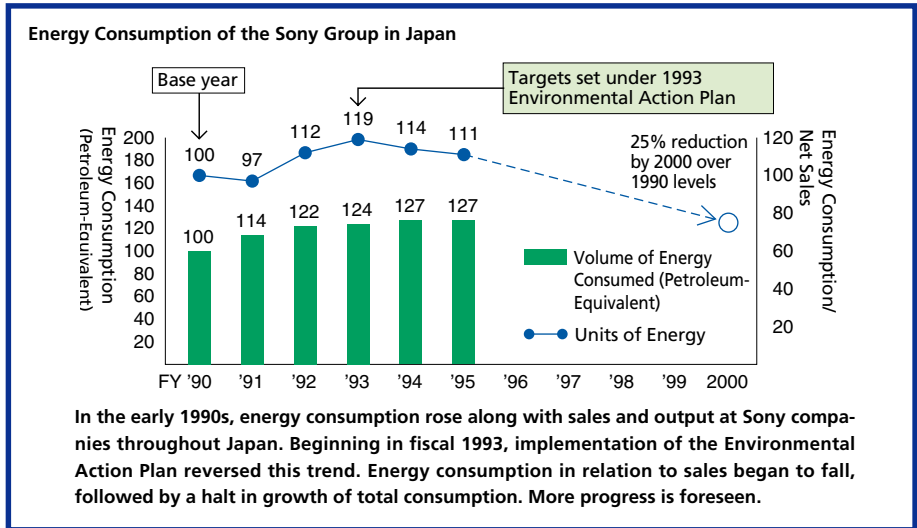
Global Warming and Energy Conservation

Fighting global warming is a top international priority at Sony. In Japan, operating bases are working to lower their overall energy consumption, and thus the amount of fuel needed to generate power and the amount of carbon dioxide emissions. The Environmental Action Plan targets substantial reductions in all forms of energy consumption by fiscal 2000. This will require progress on several fronts: more efficient production; low-power ventilation and lighting; and a variety of other energy-efficient equipment. Better building insulation is another priority. Offices are actively exchanging information on their efforts to use less energy. Special campaigns during the critical winter and summer seasons further heighten the profile and effectiveness of energy-saving measures.

Energy Star Buildings Program (U.S.)



In April 1995, Sony Electronics became a charter member of the EPA's Energy Star Buildings program. Based on the Climate Change Action Plan launched in April 1993 by the Clinton administration, this voluntary program aims to return greenhouse gas emission levels in the U.S. to 1990 figures by the year 2000. Participants pledge to take various steps to raise the energy efficiency of buildings and prevent pollution. Sony Electronics' Technology Center in San Diego installed a new roof with a reflective coating. At a new plant in Pennsylvania, new lighting systems, programmable thermostats, better insulation and a heat recovery system have all been installed. Such energy-efficient systems are expected to yield a 50% energy saving. At new facilities in Tijuana and Mexicali in Mexico, skylights are expected to lower artificial lighting requirements by 60%.



Green Lights Program (U.S.)



In the United States, Sony Electronics in 1992 became a partner in the Green Lights program being promoted by the federal Environmental Protection Agency. Under this program, the company surveys the efficiency of lighting at its buildings and upgrades systems where it is cost-effective to

make improvements. By the end of 1995, the company had surveyed some 13.9 million square feet of building space nationwide. Of the total floor space surveyed, 5.2 million square feet have been upgraded. This is over 90% of the floor space that qualifies for upgrading.

Improvement work mainly consists of replacing incandescent bulbs and other sub-standard older technology with more efficient lighting using thinner, more reflective T-8 fluorescent bulbs and more energy-efficient electronic ballast. The newer lighting also generates less heat than incandescent bulbs, yielding added improvements in air conditioning costs. The resulting savings in energy consumption translate directly into lower emissions and fuel consumption by electric power utilities.

Sony Mizunami Corporation has a comprehensive energy-saving program. The centerpiece is a co-generation system that supplies electricity and heat to a production facility, cutting purchases of grid electricity by 1,500 kilowatts.

Total floor space (ft ²)	13,938,808
Annual decrease in energy costs (\$)	1,318,173
Renovated floor space (ft ²)	5,178,072
Unrenovated floor space (ft ²)	8,760,736
Carbon dioxide elimination (lb.)	14,625,736
Nitrous dioxide elimination (lb.)	47,288
Sulphur dioxide elimination (lb.)	85,313

Sony Kohda Corporation reduced air conditioning expenses by coating the roof of its factory with a substance that reflects sunlight and provides greater insulation.

Global Warming
Mankind's unchecked consumption of energy and wholesale destruction of much of the world's forests are changing the air we breathe. As carbon dioxide, methane, freon and carbon monoxide gases increase, so do concerns about a "greenhouse effect" which could be disastrous. Some scientists predict that, if current trends persist, the average global temperature could rise by about 2.0°C by the end of the 21st century. Even this slight climb in temperature would cause the world's oceans to rise by about 50 centimeters. Subsequent changes in climatic patterns would lead to critical food shortages and severely impact all living creatures.

Protecting the Ozone Layer

The 1989 Montreal Protocol called for the immediate suspension of production of Class 1 ozone-depleting substances, or chlorofluorocarbons (CFCs), and their eventual elimination. That year, Sony formed a task force to examine measures to replace CFCs. By tackling this problem early on, Sony was able to eliminate all ozone-depleting substances from its worldwide operations by April 1993.

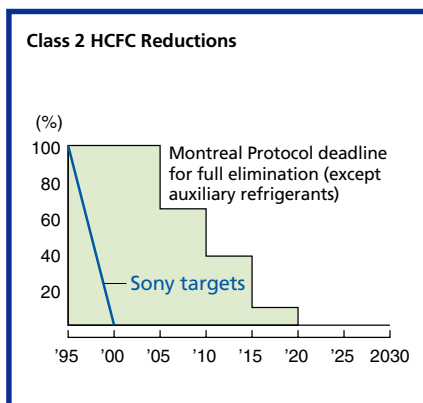
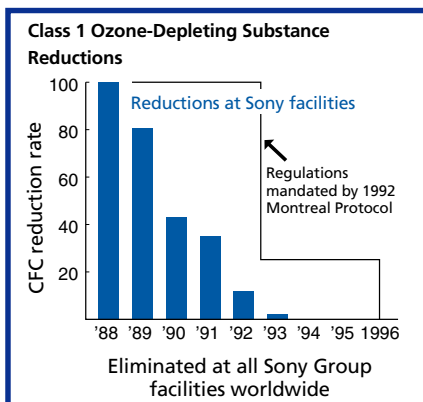
This achievement was due in large part to an extensive research program. Among the many crucial breakthroughs were a

method for producing printed circuit boards without cleansing agents; the development of an ion air cleansing process; and new applications for water-based cleansing agents. Similar CFC elimination programs have been implemented at the more than 2,800 companies that work with Sony as vendors. Sony is currently in the next stage of the program: the elimination of Class 2 ozone-depleting substances, known as hydrochlorofluorocarbons (HCFCs). The company's target date is fiscal 2000, well ahead of the 2020 deadline stipulated by international regulations.

Reduction and Prevention of Pollution

Guided by concrete objectives, Sony Group members are striving to prevent the production of pollutants. These efforts emphasize measures to deal with volatile organic compounds (VOCs), heavy metals and chlorine-based cleaning agents. All are used in the manufacture of almost every Sony product. The Group has specific goals to reduce and in some cases eliminate all of these substances by 2000.

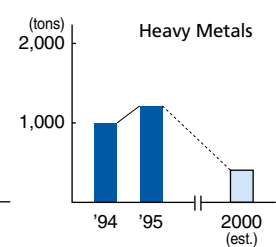
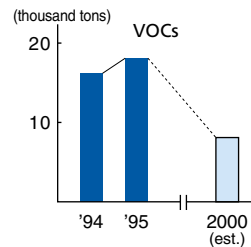
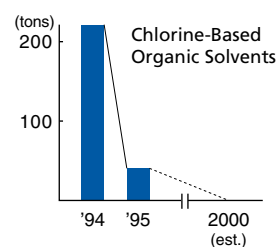
Two events in 1995 better positioned Sony to meet its ambitious goals. In February, the company established a pollution committee at the head office, representing a centralized base for monitoring group-wide environmental activities and conducting various pollution-control programs. Two months later, the Group officially adopted pollution management guidelines. Since then, the Group has continued to make progress toward its ultimate goal of zero pollution.



Inventory of Environmental Pollutants

Sony takes a global approach to the management of environmental pollutants used in production, gathering data from manufacturing bases worldwide. The main substances used are methylene chloride and other chlorine-based substances; methyl ethyl ketone, toluene, isopropyl alcohol and other volatile organic compounds (VOCs); and heavy metals such as lead and chromium. The latest figures regarding the use of these substances are reflected in the following graphs.

Sony eliminated the chlorine-based organic solvents tri- and tetra-chloroethylene from all production processes worldwide in 1995. By adopting alternative agents and taking other steps, the company further plans to eliminate the degreasing and cleansing agent methylene chloride by 2000. Although overall VOC and heavy metal use is currently increasing in line with expanding production, the company has set a goal of halving these levels by 2000. Research into alternative substances is a top priority.



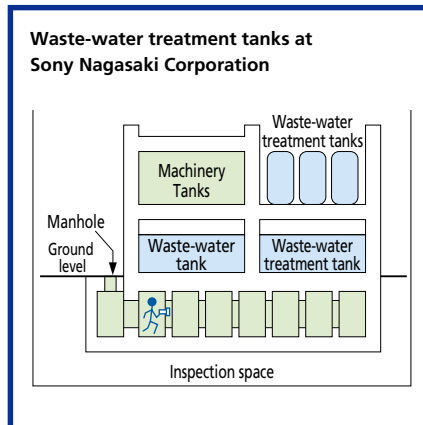
Environmental Risk Management

Sony takes many steps to prevent damage to the environment from chemicals and other effluents from its plants. The company has made extensive investments to ensure the responsible processing of waste water, exhaust gases and waste materials. Exhaustive safety measures are in place to protect the facilities that store chemicals, effluents, oil and other harmful substances. Such measures take into account natural disasters, equipment failures, accidents and other potential occurrences. Additionally, in the unlikely event of a leak, risk management systems will minimize any impact on the environment.

All members of the Sony Group not only maintain strict compliance with applicable laws, but also adhere to their own equally exacting standards. The goal is to check all types of pollution. At the heart of this policy are multi-faceted environmental risk management systems. Furthermore, while such systems are important, the company is aware that preventing pollution requires more than treatment and safe storage facilities. This is why Sony incorporates thorough environmental assessments of every product the company designs. Even production processes for new products are chosen in light of environmental considerations.

Dual-Bottom Water Treatment Tanks

At Sony Nagasaki Corporation, waste water is treated in tanks with dual-layered bases. Tanks are elevated above ground level to enable easy inspection from underneath. Furthermore, the inspection space is equal in volume to the storage tanks—this provides adequate backup space in the event of a breach in the tank base. Strategically placed sensors give immediate warning of even the smallest leak. This system virtually eliminates the possibility of damage to soil and groundwater.



Safety for Tanker Trucks

Every day, Sony takes delivery of a large volume of petroleum, chemicals and other potentially hazardous liquids. The company also has to transport certain industrial effluents as well. All aspects of tanker truck operations, especially the loading and unloading of liquids, are closely supervised. For example, trenches surround loading and unloading sites to enclose spills in an emergency. Separation tanks handle any runoff, providing a reliable barrier between oils and storm sewers.



Broadcast Products Co.

Preventing Pollution of Storm Sewers

Roads within Sony facilities have been constructed to prevent any oil spills from mixing with rainwater or otherwise conjoining with runoff that is not treated. Rainwater runoff trenches can be closed if necessary. Oil separation tanks provide still more protection.



Sony Kita Kanto Corporation

Auditing of Industrial Waste Processing

The Environmental Office in Asia focuses on conducting investigations to determine whether the unused materials, waste and other by-products generated by manufacturing processes pose any environmental hazard. The office also carries out audits to ensure that waste management contractors dispose properly of all waste. By identifying potential hazards early on, the office helps prevent serious accidents involving industrial waste materials.



The Environmental Office and Sony Video Taiwan conduct a risk assessment exercise at the facilities of a waste treatment contractor.

Using Resources Effectively Through Recycling

Sony's production innovation activities adhere to the belief that manufacturing is a process of borrowing something from nature, transforming it to benefit people in some way, and then returning to nature. The company is marshaling its vast technical expertise for the advancement of viable recycling. The company has already implemented several innovative systems. Moreover, the Environmental Action Plan sets concrete targets for the use of paper and other resources. Sony sections and offices worldwide are moving steadily toward these goals.

Development of Automatic CRT Recycling System (Japan)

Encompassing consumer electronics manufacturers and related industries, the Association for Electric Home Appliances maintains a solid foundation for the proper recycling of electronic goods. Recognizing Sony's

pioneering role in experimental TV disassembly techniques, the association in 1995 commissioned the company to develop a mass TV disassembly and cathode ray tube (CRT) recycling system. In cooperation with other recycling firms, the company launched a prototype system, the first of its type in the world, in April 1996.

The disassembly line automates much of the recycling process. First, the TV set is pried apart and the CRT removed. After removing the anti-explosion band, the CRT's front panel and rear funnel are separated. Finally, after being cleansed of any coatings, the glass is pulverized for later reuse.

Creating this system presented several challenges. The first was to discover a safe method of recycling the CRT glass, which contains lead. Engineers also had to deal with the television's many different parts. Finally, new types of automated facilities were required to enable recycling on a mass scale.

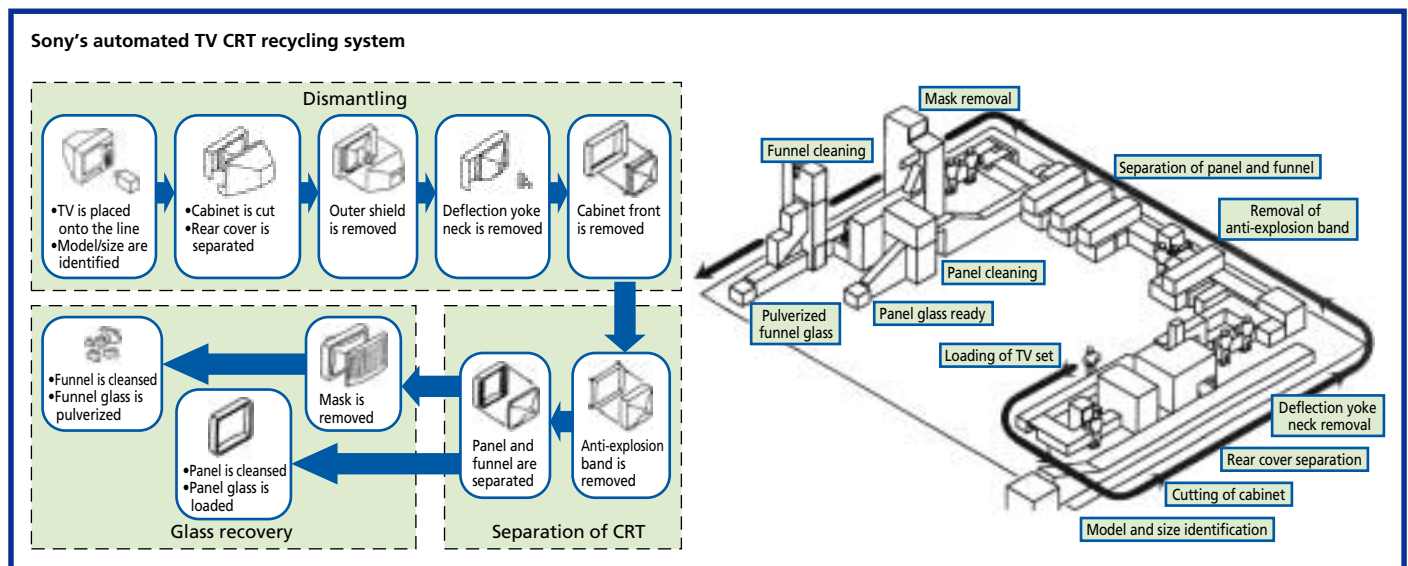
The prototype system can recycle color

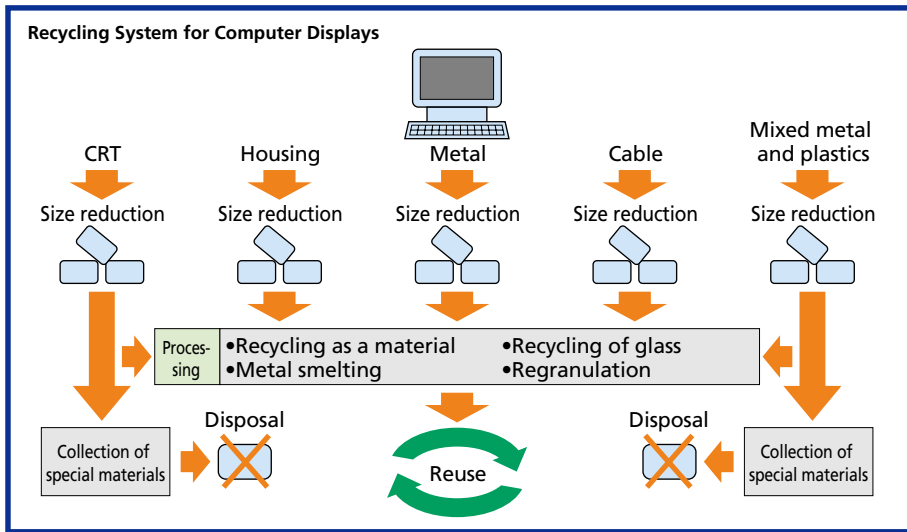
TV sets ranging from 12 to 27 inches. Assuming 8-hour daily shifts, the line can handle roughly 100,000 sets per year. About 70% of the line is automated, requiring only 9 people for loading and administration. Perhaps most impressive, the line boasts a recycling rate of approximately 70% for glass, steel, plastic and other materials.

Breakdown of TV Materials

CRT unit	55%
Plastic	12
Wood	10
Circuit board	10
Deflection yoke	2
Wiring	2
Steel	1
Others	8
	100%

Estimates of composition by weight based on internal inspections





Computer Display Take-Back Initiative (Germany)

In Germany, Sony Computer Peripherals Components Europe began offering the industry's first take-back scheme for computer displays in March 1996. Since then, a recycling label is delivered with all Sony computer displays that are put on the market. For a small fee, the label can also be purchased separately. Any display bearing this label can be returned at no cost to one of 800 collection points nationwide, from which it is collected and recycled by a partner firm.



Recycling of Rechargeable Batteries

The recycling of some rechargeable batteries, such as nickel-cadmium (Ni-Cd) and sealed lead batteries, is already mandated by law in the United States and the European Union. Sony companies in these regions are actively involved in such efforts. In Japan, recycling laws now require Ni-Cd batteries to be labeled. Sony anticipated this trend well in advance: in June 1992 the company became first in the industry to initiate the collection and recycling of Ni-Cd batteries.

Sony began producing and marketing lithium ion batteries in 1990. Their electrodes incorporate cobalt, a rare-earth metal. In the future, the recycling of such batteries may

Types of Batteries

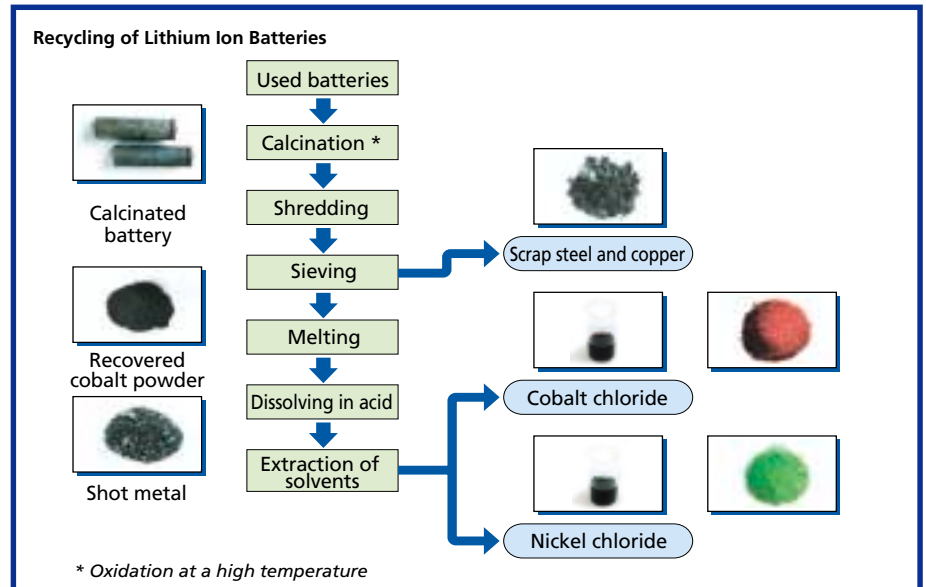
Physical Batteries—batteries that produce electrical energy through a physical process, such as solar batteries

Chemical Batteries—batteries that produce electrical energy through a chemical reaction, such as:

- disposable batteries, including dry cell and button batteries
- rechargeable batteries, including Ni-Cd and lithium ion batteries
- fuel cells

be mandated by law. However, prompted by its policy of resource conservation, Sony decided to address this issue pre-emptively. Thus, with Sumitomo Metal Mining, the company unveiled a lithium ion battery recycling process in 1996. This process can recover not only cobalt but also steel, copper and nickel chloride from the batteries for reuse. The importance of this technology will continue to rise alongside growing demand for lithium ion batteries in consumer electronics applications.

With the development of this technology, Sony became the only manufacturer in North America or Japan to collect and recycle all four types of rechargeable batteries: Ni-Cd, sealed lead, lithium ion and nickel-metal hydride. The company will continue to channel its unique technological capabilities into the creation of other ways to use resources more effectively.



Styrene Foam Recycling System: Orange R-net

In 1994, the Center for Environmental Technologies created an ecologically sound material recycling method for styrene foam. Researchers found that the foam dissolves in liquid limonene, a natural isomeric terpene extracted from the skins of tangerines or other citrus fruits. Sony successfully incorporated this method into a large-scale recycling plant. This will enable the effective reuse of styrene foam, previously considered to have a high environment impact. At the same time, it will provide a steady supply of high-quality polystyrene.

In October 1996, Sony began trial collections of styrene foam in the Tokyo metropolitan area under the project name Orange R-net. The company is studying ways of turning the project into a full-scale business, and formed a project team to this end. Sony also launched an extensive PR campaign, using TV and newspaper ads, expositions, and study tours to explain the benefits of the system to industry members and the public at large. The company hopes the application of this system will spark even greater product packaging recycling efforts in Japan and, ultimately, worldwide.

Plastic Recycling

Plastic recycling can be divided into three major areas:

Material recycling: Reusing the materials as they are

Chemical recycling: Altering the chemical structure for reuse as fuel or as a raw material in another plastic

Thermal recycling: Burning the plastic to recover and use the energy generated in the form of heat

Molecular structure of d-limonene



Specific gravity (20°C)	0.844
Viscosity (25°C, cp)	0.98
Boiling point range	175-179°C
Flash temperature	48°C
Solubility (water)	Insoluble
Solubility (IPA)	Fully soluble



Sony Electronics' Technology Center-Pittsburgh

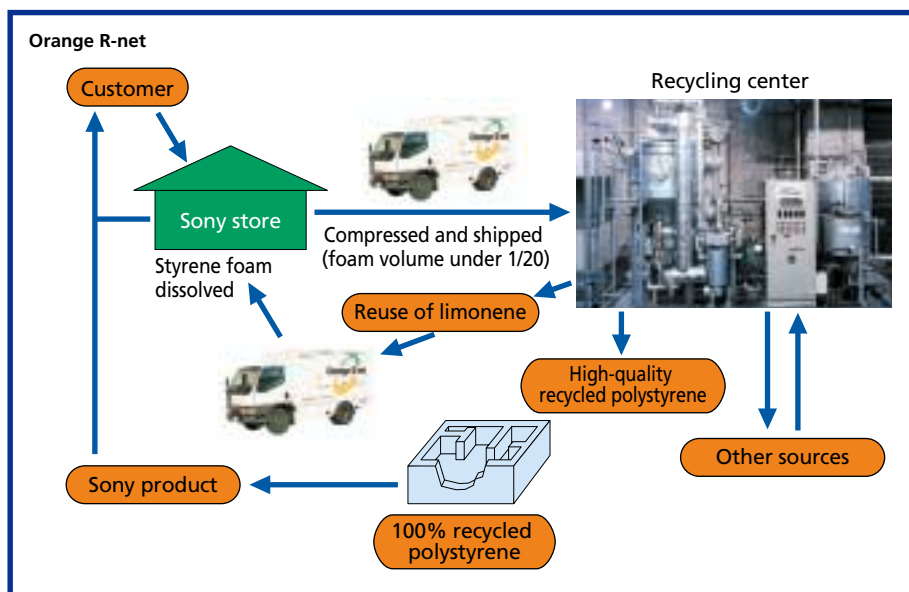
Environmental Action at the Factory Level (U.S.)

“Reduce, reuse and recycle” is the theme guiding the environmental activities at Sony Electronics' Technology Center-Pittsburgh in Pennsylvania. The plant produces rear-projection and direct-view color TVs, thermal transfer ribbons, and aperture grilles, a key component of the Trinitron CRT. These operations generate a variety of residual materials. In 1995, the plant recycled roughly 4 million pounds of residual materials that could not be reduced or reused in other processes. Aside from protecting the environment, these actions yielded significant savings in terms of waste disposal and new material procurement.

Fully 100% of scrap rear-projection CRT glass from the plant is recycled and recovered at primary lead production facilities. All scrap glass from direct-view CRTs is also recycled. Further, the plant is recycling un-reusable metal parts. The plant contracts with metal-recovery vendors to recycle scrap steel from the production of aperture grilles as well as aluminum, stainless steel and rolled steel from components used in rear-projection CRTs.

One more responsibility of the plant is the collection and recycling of cardboard—currently its leading recycled material. Damaged and defective circuit boards that cannot be repaired, along with oxidized dross from automatic soldering machines, are also being recycled by local vendors.

Wood pallets and crates used to ship parts and equipment to the site are a major part of the residual stream requiring disposal. Plans call for employees from all departments at the plant to collaborate in identifying and implementing effective recycling options for the surplus pallets and crates in 1997.



Global Activities

Sony's environmental philosophy pervades the operations of Group companies around the world. At the same time, however, regional representatives strive to tailor activities to local requirements, whether legal, cultural or geographical. This is a prime illustration of the overarching concept to which Sony adheres:

"Think Globally, Act Locally"

Europe

Staying Attuned to Regional Demands

Each country in Europe has differing regulations and market attitudes regarding environmental matters. One example is the variety of regulations governing the disposal of electronic devices. All Sony bases maintain close relationships with their local markets. Backing this up is the Environmental Center Europe, located in Germany, which provides a forum for Sony people throughout Europe to exchange information and ideas.

Disassembly Evaluation Workshop

Sony has long made efforts to design products to extend their service lives and facilitate recycling. The Disassembly Evaluation Workshop, formed in mid-1995, is at the heart of this drive. The workshop's main function is to examine products designed in Europe, as well as elsewhere in the world. The efforts of the workshop yield valuable insights on methods for making new products easier to dismantle and to recycle (see page 11).

Environmental Training Programs

Employee education programs, in concert with an efficient system for disseminating information, are critical to the success of any environmental management effort. At the



Disassembly Evaluation Workshop

Environmental Center Europe, people from all Sony European bases can obtain information on pertinent topics. Data on general environmental issues and specific Sony-related issues are available. The center also created an environmental exhibition—in five languages—that toured all of Sony's European sites.

More Alternatives for Styrene Foam

Recycling is just one way to approach the problem of styrene foam. Finding viable alternative materials is another. In cooperation with its European TV operations and the Environmental Center Europe, Sony began developing "multi-way air packaging" for TV sets, which can be collected at the time of delivery. This new packaging offered poten-



Environmental Exhibition

tial cost savings and lower environmental impact than styrene foam. However, studies revealed that the multi-way packaging would require major revisions in transportation methods, making implementation difficult in the short term. The European TV group continues to study this issue, while pursuing the development of other alternatives to styrene foam packaging (see page 10).



French Plant Recycles 100% of Solvents

Sony's Dax Plant in France earned the "Regional Award of Environment for Industry 1995" in recognition of its excellence in the use of resources and waste management. The plant, which makes magnetic tape, received particularly high marks for its ability to recycle all solvents. Approximately 65% of solvents are recycled and the remainder burned for energy, thereby reducing the need to consume other fuels.



Recycler of Distinction Award Presented to U.K. Plant

In April 1996, Sony Manufacturing's Bridgend CRT production facility received the Recycler of Distinction Award from the U.K. Minister of State for the Department of the Environment. This honor was mainly in recognition of Bridgend's expertise at recycling styrene foam. Introduced six years earlier, the recycling program is an integral part of the CRT production process. The plant currently recycles all styrene foam, representing about 200 tons of materials that would otherwise end up in a landfill.



New Alternative Product Material

Sony's European audio group has come up with a technique for making loudspeaker boxes from Tectan, a material made from recycled Tetrapak cartons. Tectan consists of 75% paper, 20% polyethylene foil and 5% aluminum. The front of the box is a medium pressure fiber plate, which is attached to the Tectan panels with screws for easy dismantling. The speakers, which boast outstanding acoustic characteristics, are scheduled to reach selected European markets in 1997.



World Business Council for Sustainable Development

Through the Environmental Center Europe, Sony is an active member of the World Business Council for Sustainable Development, a coalition of more than 120 multinational companies. Among its many activities, Sony has assumed leadership of the "eco-efficiency" working group, formed in the summer of 1996. This group demonstrates ways in which ecological programs can contribute to economic efficiency. Group members focus on four topics:

- formulating scenarios over a 10- to 15-year time frame
- promoting information disclosure among members of the chemicals and electronics industries
- developing a minimum basic worldwide policy for the treatment of products at the end of their lives

- setting new standards for benchmarking and establishing a common policy for all environmental marketing



CARE "Vision 2000"

The CARE "Vision 2000" program was launched in 1993 as a research platform for pursuing joint solutions to complex problems involving the recycling of electronics equipment. Under the aegis of the newly formed EUREKA initiative sponsored by the European government, this program brings together more than 125 participants from the electronics, computer and recycling industries in Europe. Also included are industrial associations, research institutions and universities. With ECE assuming responsibility for the overall organization, Sony strongly supports this program. Frankfurt was the site of the first major congress in November 1996, which provided an opportunity for reports on ongoing and upcoming plans as well as discussions. Called "CARE Innovation '96," this event was the first of three such events planned in cooperation with the German Federal Ministry for the Environment, EUREKA and EXPO 2000. The second gathering is slated for Vienna in 1998 and the third for Hanover during that city's world exhibition EXPO 2000.

CARE: Comprehensive Approach for the Recycling of Electronics



Note: Other information on Europe can be found on pages 11, 13, 18 and 26.

North America

End-of-Life Actions

Under this plan, Sony Electronics devised its policy on responding to growing customer concerns about used electronics products ending up in landfills. Armed with this policy, customer service people and other employees can better respond to inquiries about end-of-life Sony products. Included in the policy is the following statement:

“Product stewardship is the environmental responsibility for the fate of a product through its life cycle, from manufacturing to end-of-life. Sony Electronics recognizes that, as a manufacturer of electronic products, it shares with its customers the product stewardship responsibility.”

Aggressive Stance Toward Recycling

Sony Electronics' policy is to encourage and promote the environmentally sound recycling of all electronic waste. The company seeks to recycle all waste generated in the manufacture of its products. The company designs, manufactures, labels and packages products in a way that facilitates the recycling of products once their useful life is over. For every Sony-brand product and component it makes or sells, Sony Electronics determines the most environmentally sound end-of-life recycling method or, if applicable, the most environmentally sound method of disposal. In support of this policy, the company works with its customers to encourage and facilitate the recycling of electronic waste.

Product Recovery and Recycling

Sony has three major product take-back programs in North America. The first was a nickel-cadmium battery program launched in 1992 by Sony Electronics. This was subsequently expanded to cover all rechargeable batteries in 1995. Under this program, Sony pays for the shipping and recycling of any Sony rechargeable battery. Consumers merely bring the batteries to a Sony service center or call a toll-free number to receive a prepaid envelope (see page 18).

The Consumer Products Center was opened in 1996 in Nuevo Laredo, Mexico, to accept all product returns. Products that cannot be repaired are recycled—this currently amounts to more than 450,000 products per month. In 1997, Sony is implementing a recycling program for replacement cathode ray tubes. Each time a service center or authorized dealer replaces a Sony CRT, the old one is sent to a facility where 100% of the components are reused.

Emissions Into the Environment Fall Steadily

Despite the continued expansion of North American operations, the volume of emissions into the environment has been declining steadily. In 1996, emissions were 3% less than in 1995—the sixth consecutive year-on-year decrease. Furthermore, emissions were 75% below 1988 levels despite the much higher use of water, energy and chemicals. This feat was accomplished despite the fact that several large facilities came on-stream: a Consumer Products Center and magnetic molding and tape facility in Nuevo Laredo, Mexico; a television component facility in Mexicali, Mexico; a 35-inch television operation in Pittsburgh; and a chemical vapor deposition process at Materials Resource

Corporation in Gilbert, Arizona. Additionally, a CRT glass plant in Pittsburgh and a VCR assembly plant in Tijuana, Mexico have recently started production (see page 15).



American Video Glass Company

Recycling Operations Set New Record

North American operations set another recycling record in 1996. More than \$1.8 million was saved through the recycling of over 36,000 tons of materials, ranging from discarded circuit boards to office paper. This represents 1.8 tons of materials for each employee of Sony Electronics and an overall recycling rate of 70% of waste generated. The top recycler for the third year running was the Audio Manufacturing Division, which achieved a recycling rate of 87%. Complementing the recycling programs are extensive energy conservation programs. In 1996, these programs resulted in savings of 23 million kilowatt-hours and cost reductions of \$1.3 million (see page 14).

Environmental Audits

Environmental auditing at North American operations was initiated in 1984. Each operation is audited annually with follow-up inspections of major operations every three months. In 1996 alone, Sony implemented more than 350 recommendations resulting from these audits.

Communication Program

Sony North America issues several publications, each targeting a different audience. A monthly report is sent to key environmental contacts at all North American operations as well as world-wide regional coordinators. All employees receive an environmental theme calendar. Another publication, the Environmental Annual Report, was introduced in 1996 to provide an overview of the previous year's environmental activities (see page 25).



Sony Meets EPA Energy Star Standards

Sony Electronics is concentrating on ensuring that the computers and related products it uses are environmentally compatible. Currently, all of the company's computers and monitors comply fully with Energy Star standards set by the EPA (see page 14).

Note: Other information on North America can be found on pages 6, 13, 19 and 27.

Asia (Outside Japan)

Sony companies in Asia are embarking on a number of environmental programs to enhance environmental performance as well as competitiveness. These activities concentrate on two key areas: environmental management and environmental technology.

Environmental Management Programs

Sony manufacturing bases in Asia do not stop at merely obeying existing regulations. Acting on their own initiative, these bases are seeking to build outstanding environmental management systems. In line with

the establishment of ISO-14001 standards, plants throughout the region are actively participating in pilot certification programs under the direction of various governmental agencies. In this way, Sony is serving as a model for other manufacturers in Asia. The drive to establish environmentally viable processes paid off as six Sony companies were awarded ISO-14001 certification in 1996:

- Sony Display Device Singapore became the first company in Singapore to receive ISO-14001 certification
- Sony Electronics Korea received certification from TÜV
- Sony Precision Engineering Center Singapore became Singapore's third company to be certified
- Sony Video Taiwan was the first company in Taiwan to be awarded the ISO-14001 by the Bureau of Commodities Inspection & Quarantine
- Sony Electronics Malaysia and Sony Mechatronics Malaysia were two of the first five companies in Malaysia to receive certification

Other manufacturing operations are striving to attain ISO-14001 certification across the board by March 1998. The company is also working to extend the ISO-14000 series. Group companies in Malaysia and Singapore represented Sony at an international technical committee meeting, TC207, to develop new technical standards. Representatives from the Sony office in



Singapore are currently involved in a sub-committee, SC3, to establish eco-labeling standards.

Environmental Technology Programs

As more Sony companies in Asia attain ISO-14001 certification, the development of new technologies is becoming increasingly vital to achieving further improvements in environmental performance. Group companies have embarked on a number of programs blazing the trail toward more progress and enhancing Sony's competitive position. In 1996, Sony identified the optimal way to implement such programs as:

- waste minimization
- development of eco-viable products
- recycling technologies and process innovation
- management of hazardous substances and other waste

Singapore Green Leaf Award

The Sony Group in Singapore was honored with the Green Leaf Award by the Minister of Environmental Affairs. The award is conferred upon firms who make exemplary contributions to the environment and society. Sony was recognized for promoting a diverse range of programs. Of particular note is a paper recycling program that generated a total of S\$160,000, which was donated to a charity involving kidney disease research and other worthy causes. Sony representatives accepted this honor during Singapore's Clean & Green Week in November 1996.



Note: Other information on Asia outside Japan can be found on page 13 and 16.

Sony Puts a Halt to Wasteful Engine Idling

In Japan, Sony is participating in an Environment Agency program aimed at eliminating unnecessary engine idling in company vehicles. Initiated in November 1996, this campaign is now part of the daily operations of each Sony business location in Japan. At the head office, all company vehicles display "Stop Idling Movement" stickers inside and out. Flags bearing this slogan are prominently located at parking areas as well. Benefits are enormous. Eliminating just 30 minutes of idling per vehicle each day translates into a group-wide annual saving of ¥15 million. Campaigns to encourage safe, energy-efficient driving practices complement the no-idling campaign.

Children's Pictures of Earth Day

Since 1991, Sony Electronics has sponsored an Earth Day art contest for children. Entrants are asked to express a particular environmental theme in an artistic format. Energy conservation has been the theme since 1994. Winning entries decorate calendars that are distributed to all Sony Electronics personnel.



Working With Junior High School Students (Japan)

The Japanese government named Hino Junior High School, near the Tokyo head office, as an environmental school for fiscal 1995. Sony seized this chance to extend its support. Sony instructors are teaching classes on environmental topics in each grade level. The company's environmental technology is on display at the school's annual fair; one exhibit shows how limonene can be used to recycle styrene foam. Students are also invited to check out the Eco Plaza and other facilities at the head office.

Environmental Fund

Sony's environmental fund supports the development of new environmental technologies. Since its inception in January 1993, the fund has supported 41 projects, out of a total of 51 proposals submitted. Any Group member can apply. Ideas must be innovative and make a meaningful contribution to the environment. The Sony Environmental Conservation Committee studies the proposals and recommends those projects it deems worthy of head office funding.

Sony Environmental Award

Initiated in 1994, the Sony Environmental Award honors achievements in environmental protection.

All Group companies and their employees can submit applications. Recognition is given to accomplishments in the fields of technology, products and management that can be applied to worldwide operations. Outstanding achievements are awarded a grand prize. At the 1996 ceremony, 62 applications from Japan and 29 from overseas vied for awards. After careful deliberation, the selection committee gave out four grand prizes, one technical award, four product awards and ten management awards. In addition, eight applicants received special recognition for their contributions to the environment.



1996 Sony Environmental Award Winners

Grand Prize

■ Improved Bi-National Solid Waste Recycling

Sony Video-Tec de Mexico S.A. de C.V. and Support Center

Two Sony facilities in Mexico decided to find an alternative to transporting waste from their production activities to a U.S. landfill. Sony Video-Tec de Mexico and its support center accomplished this goal by setting up a recycling program with a local waste management company. Operational since 1993, the system has dramatically increased the amount of waste that is reused in some way.

■ Environmental Management System and Conservation Activities

Personal A&V Products Company, Environmental ISO Promotion Committee; Sony Kohda; Sony Minokamo; Sony Kisarazu

Several Group members joined together to create a framework for the promotion of environmental protection activities. Their efforts led to substantial reductions in waste generated, energy consumption, paper and the emission of pollutants. Conforming with international standards, the environmental management system was also instrumental in the receipt of BS7750 and ISO-14001/DIS certification.

■ TV and Cathode Ray Tube Recycling Technology

Manufacturing System Business Center, FA Systems Dept.; Products Recycling Subcommittee, TV Scrap Working Group (see page 17)

■ Revolutionary Energy-Efficient LCD Rear-Projection TV

Semiconductor Company, LCD Dept.; Display Company, Consumer Projection TV Dept.

Using internally developed state-of-the-art 1.35-inch polysilicone TFT LCD panels, Sony was able



Replaceable high-brightness lamp

to create a large-screen, lightweight rear-projection TV. The red, green and blue colors each use a compact optical unit made up of three LCD panels. The 37-inch screen is only 39 cm thick, about the same as a 14-inch CRT TV, and weighs only 29 kg, comparable to a 24-inch CRT TV. As a result, it requires much less packaging and cushioning materials. A newly developed 100 watt high-brightness lamp reduces power consumption from 200 watts to 160 watts. The lamp can be easily replaced by the user.

Technology Prize

■ Recycling Dye From Video Printer Ink Ribbons

Research Center, Center for Environmental Technologies; Recording Media & Energy Company, Technical Group, Research Center and Print Media Dept. (see page 8)

Product Prize

■ Resource and Energy-Saving Deflection Yoke

Display Company, Deflection & High-Voltage Devices Dept.

A major upgrade in the design of several models of deflection yokes, a key component of television and computer display picture tubes, cut the number of parts needed and reduced energy consumption levels. One model now uses 34% fewer parts and uses 8% less energy compared with previous models.



New 28-inch wide CRT deflection yoke (left)

■ Resource and Energy Saving Optical Pickup

Computer Peripherals & Components Company, Electronic Devices Div., Optical Devices Dept.; Semiconductor Company, Semiconductor Laser Dept.

The development of ultra-compact devices and other breakthroughs yielded dramatic improvements in optical pickups. The number of components decreased by 48%, weight by 35% and energy consumption by 31%. Moreover, the packaging for source components can be used to ship the finished pickups as well.

■Energy and Resource Saving Large-Screen TV

Display Company, Japan TV Dept.

Embracing the challenge of slashing the energy requirements for Sony large-screen TVs, technicians came up with a unit that consumes only 132 watts, much lower than before. In standby mode, power consumption is half that of previous levels. Helping make this possible is a reduction of roughly 40% in the number of components. To simplify recycling, the TV employs polystyrene material for a much broader range of components.

■"Stamina Handycam" Line Offering Long Recording Time

Personal A&V Products Company, Personal Video Div., PV1, PV3 and PV4 Depts. (see page 10)

■Management Prize

■Waste Water Recycling and Reuse

Sony Display Tube Company

At the San Diego CRT plant, Sony designed and installed a water recycling and reuse system—the world's first such system in operation at a CRT factory. The system can make a vital contribution to other water-scarce regions like San Diego.

■Total Environmental Management

American Video Glass Company

When Sony decided to build a CRT glass plant in the United States, a number of exacting environmental regulations had to be met before construction could begin. American Video Glass Company, owner and operator of the new plant, instituted a comprehensive environmental management program. This brought the planned factory in line with Clean Air Act and other government standards for nitrogen monoxide emissions and waste water treatment.

■Improved Environmental Performance

Sony Manufacturing Company U.K., Pencoed Technology Center

The Pencoed Technology Center formulated a clearly defined environmental philosophy and has taken measures to translate this thinking into concrete actions. Outstanding improvements have been achieved in the reduction of waste, energy and water consumption, and the volume of paper used.

■EMAS Environmental Management System

Sony-Wega Produktions G.m.b.H.

The environmental management system at Sony-Wega boasted excellent performance during the year, meeting the stringent standards of the European Union's Eco-Management and Audit Scheme (EMAS). The firm thus became the first Group member in Europe to earn EMAS certification, and only the second private-sector electronics plant in Germany to do so.

■Computer Display Recycling System

Sony Deutschland International; Computer Peripherals Components Europe (see page 18)

■Promotion of SEM Environmental Activities

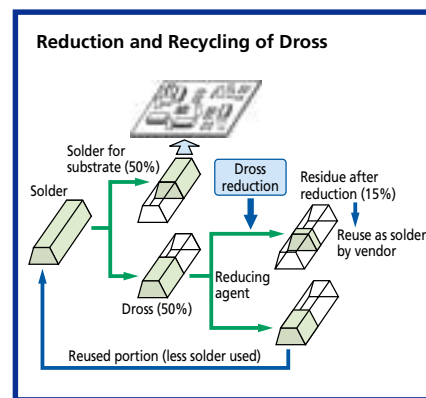
Sony Electronics (Malaysia) Sdn. Bhd.

In its drive toward ISO-14001 certification, Sony Electronics (Malaysia) was recognized for its excellence in the dissemination of information on environmental activities. Activities included seminars and exhibitions targeting government agencies, non-government organizations and the general public.

■Dross Reduction Agent Yields Lower Solder Use

Personal A&V Products Company, General Engineering Dept.

In the soldering process, about half of the solder turns into dross, or oxidized solder. Properly treated through a reduction process, the dross can be used again as solder. Sony technicians developed a standardized process using a reduction agent to recover 70% of the dross—enabling a 35% reduction in solder use.



■Reuse of Lithium-Ion Battery Materials

Sony Energytec Inc., General Affairs Dept.

Sony Energytec created a method for recycling and reusing a large share of the waste produced during the production of rechargeable lithium-ion batteries. This method materially cuts down the amount of materials that must be discarded (see page 18).



■Color TV Designs for European Standards

Display Company, Europe TV Dept.

With the backing of all related Sony divisions and firms, Display Company designed a color TV that accurately reflects the exacting ecological demands of the European marketplace. One of the design's most notable aspects is beznet, made of a non-coated, halogen-free, flame-retardant materials, that is integrated with the speaker grille. This allowed fewer components and materials. The TV also replaces screws with joints for the speaker box and baffle boards that are made of the same material as the box—requiring no time to dismantle.

■An Organized Approach to Environmental Activities

Broadcast Products Company, Four Environmental Activity Subcommittees

Broadcast Products established an effective organizational approach to environmental action. The project included setting out standardized design and assessment guidelines for lower power consumption, easier disassembly and increased recyclability. More effective management of hazardous pollutants was another focus.



KV-C29 series TV with integrated beznet and speaker grille

■Sony Europe Environmental Award

This award was established in June 1995 as an additional means to encourage environmental activities by Group members in Europe. As with the Sony Environmental Awards, recognition is given to technical, product and management achievements. Furthermore, chairman of European Operations Jack Schmuckli initiated the Eco-Efficiency Award to link economic and ecological efficiency. Winners are chosen on their ability to make a lasting contribution to environmental protection. In 1996, 16 applications were received. After a careful screening process, one technical award and three management awards were presented at a September 1996 ceremony.

Social Responsibility

Sony's community affairs involvement encompasses a broad range of activities in the disparate areas of social welfare, education, culture, the arts and international exchanges. The following are just a few illustrations of the company's participation in various activities related to the ecology and environmental protection.

Regional Cleaning Movement (Japan)

Since 1991, volunteers from Sony Oita Corporation gather twice a year and spend an entire day cleaning debris and litter from the Kurotsuzaki coast. More than 100 people take part in this activity each time.



Employees work to beautify the Kurotsuzaki coastline on Earth Friendly Sony Oita Day.

A Welcome Mat for Swans (Japan)

Each year, employees of Sony Shiraiishi Semiconductor help make migrating swans feel welcome. People remove litter from areas where the swans stop, and leave food for the hungry travelers.



Walking Clean-Up Campaign (Japan)

Sony Ichinomiya Corporation volunteers spend a day walking along a much-used bicycling path in the area, picking up and carting home all sorts of litter. Much of the path runs along the banks of the Kiso River, which circumnavigates Nagoya to flow into the Ise Bay.



Springing to Action in Oil Spill Clean-Up (Japan)

The Sony Group responded quickly to the devastating oil spill from a Russian tanker in the Sea of Japan in January 1997. Volunteers, including an entourage of 50 from Sony Inasawa Corporation, helped to remove oil from beaches and search for other soiled areas of the coast. Assistance also came in the form of equipment: Sony donated 23 barrels as well as 8-mm video cameras, TVs and other equipment for recording the damage.



Bringing Life to a Special Kind of Camp (U.S.)

Volunteers from Sony Pictures Entertainment planted seedlings at a camp in northern California that is host to children battling cancer. A similar volunteer program in Los Angeles helps brighten up the atmosphere of homes for the elderly by painting walls and planting trees and flowers.



Sony Kohda Receives Greenery Award

At the 1996 annual meeting of the Japan Greenery Center Foundation, Sony Kohda Corporation was presented with the Outstanding Plant Greenery Management Award. This marked the first time a Sony company has received this prestigious award, which is sponsored by the Ministry of the International Trade and Industry (MITI). Earlier in the year, the company received similar recognition from a local MITI office. Sony Kohda has long made environmental activities central to its operations. Employee activities, the management of vegetation and the maintenance of green areas that are open to the public were deciding factors in this most recent award.

Keeping Neighborhood Parks Litter-Free (U.S.)

A Sony Electronics office in northern New Jersey boasts a squadron of volunteers that help keep a nearby public park clean. Sony people remove litter from Van Saun Park in the city of Paramus, and perform a number of other cleaning tasks.



Project E.A.R.T.H. (Canada)

To the people of Sony Music Entertainment Canada, the word "earth" stands for "Environmentally Aware and Ready To Help." More than just a slogan, this philosophy is backed up by a broad range of activities to preserve and improve the global environment.



Calendars and pamphlets are printed on chlorine-free paper that is 100% recyclable.

Harpy Eagle Rehabilitation Project (Panama)

Sony Corporation of Panama is working with the Panama government and outside specialists to establish an ambitious rehabilitation program for the endangered harpy eagle, the national bird and the world's largest raptor. The project includes a state-of-the-art aviary and learning center.



For more information or questions about Sony's community affairs activities, please contact the Corporate Community Affairs department in Japan at:
Tel: 81-3-5448-2355 Fax: 81-3-5448-2183

DATA

Gathering Environmental Data From Sony's Operations

Regional Data Collection

Once or twice a year, each regional Environmental Conservation Committee gathers data about energy consumption, waste and other environmental areas from the plants and offices in its region. This information is used to check progress in meeting the region's Action Plan targets. The information can also be compiled and forwarded to various sections as needed to help in the revision and refinement of environmental programs.

Business Group Audits

From relevant plants in each business group, Sony consolidates data concerning the use of chemicals in manufacturing activities. This data is vital in determining how each Sony product is made. Based on the information obtained, the company studies ways of using smaller amounts of chemicals and possible alternatives. These findings are then incorporated in revisions to the production process.

Global Data Collection

Every year, regional environmental data and chemical use data from the separate business groups are reported to the Environmental Conservation Committee in Japan. Gathering this information allows the company to ascertain the total environmental impact of the Sony Group's business activities. All the ECCs can then discuss the progress made in meeting the objectives of the Environmental Action Plan when they convene at Environmental Conferences. The company is also studying ways to quantify the environmental impact of products themselves.

Regional Environmental Conservation Committees

