ESH Report 2000

Respecting Nature
Serving Communities

Green Management 2000

Samsung's Green Management philosophy can be summed up as "preserving the environment and improving the quality of lives by engaging in business activities that respect both people and nature."

The green "S" symbolizes Samsung embracing the blue planet to signify its industry-leading efforts to protect the earth and the environment.

CEO's message

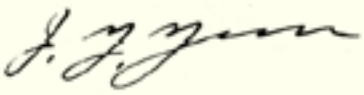
The Green Management at Samsung Electronics is based on reverence for life. We help preserve the environment and improve the quality of life by engaging in business activities that respect both people and nature. We voluntarily pledge our commitment toward environment, health and safety to our customers and to the society in general. In the process, we maintain high ethical standards and fulfill corporate responsibility to the society.

Samsung Electronics first announced its Environmental Policy in June 1992. Subsequently, basic environmental protection facilities and an environmental management system were put in place with the aim of preventing pollution-causing accidents. In May 1996, we took our policy a step further with the declaration of the Samsung Green Management Charter. Environment, safety and health are now the core values behind all product processes, including design, procurement, production, sales and disposal. Our corporate philosophy now focuses on minimizing impact of business activities on the environment and on being constantly involved in projects to restore the environment in local communities.

Samsung Electronics has always strictly complied with laws in Korea and host countries overseas as well as with international environmental agreements. At the same time, we have initiated a variety of Green Management projects. For example, we develop environment-friendly products that both preserve the environment and provide conveniences to people. Clean production technology is applied, and process safety management methods are adopted to create a pleasant and safe work environment.

Meanwhile, we sponsor a wide range of environmental preservation activities. These include an environmental investigation for young students, a clean-up campaign of the Han River, ecological studies of local communities and support to schools having environmental "sisterhood" relations with the company. We also exchange information internationally and observe the declaration set forth by the International Chamber of Commerce, the World Business Council for Sustainable Development and the World Semiconductor Council.

We at Samsung Electronics strive to be the best in everything that we do. We remain committed to providing customers with the best products and services, ensuring that work operations and products are environment friendly and safe, and making our sites pleasant places to work. In return, we receive people's loyalty and respect.



Jong-yong Yun, Vice Chairman & CEO

Green Management Policy

Samsung Electronics' core values start with a reverence for life. Corporate activities are motivated by a respect for people and nature, and they are aimed at improving the quality of life while preserving the earth's environment. The Green Management program puts a priority on the environment, health and safety for every corporate activity carried out at home and abroad. By faithfully adhering to the program, Samsung Electronics will be one of the world's leading "Green" companies of the 21st century.

1. We shall comply with all domestic and foreign laws and abide by international agreements, while establishing even stricter company standards, which will be continuously tightened. We shall also make public our Green Management activities.

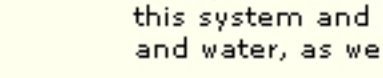
2. We shall always strive to preserve the earth's environment. To this end, we shall discontinue the use of CFCs that depletes the ozone layer and minimize the amounts of CO_2 and PFCs that we generate, as these substances contribute to global warming.

3. We shall build a management system that ensures that the environment, health and safety remain the top priorities in all corporate activities. All employees shall follow this system and work to minimize the use of raw materials, sub-materials, energy and water, as well as generation of waste.

4. A pleasant work environment shall be provided to all employees, whose health and welfare will be cared for. Ongoing training shall be administered to enhance employee awareness of the environment, safety and health.

5. The procurement priority will be on environment-friendly products. We shall support and maintain partnerships with suppliers that also practice Green Management.

6. We shall establish emergency plans and procedures to deal with the unexpected. Moreover, we shall fulfill our corporate obligations to society by expanding our environment, safety and health activities in the interest of developing local communities.



Jong-yong Yun,Vice Chairman & CEO
May 15, 1996

Green Management System

Samsung Electronics' Green Management program fulfills the company's social obligations with respect to the environment, safety and health. The objective is to realize a win-win management philosophy that promotes the development of subcontracted suppliers and local communities. Samsung Electronics also practices Green Management at its overseas operations, as a company that respects the environment, safety and health throughout the world.

- **Greening of Management**
  Ensuring continuous improvement by keeping the public informed.
- **Greening of Products**
  Remaining responsible throughout the product life cycle.
- **Greening of Processes**
  Implementing clean process technology.
- **Greening of Workplaces**
  Operating production facilities free of pollution, accidents and illness.
- **Greening of Local Communities**
  Maintaining "green" partnerships.

Greening of management

Samsung Electronics recognizes that the environment, safety and health are central to all corporate activities. These considerations are fully reflected in company policies. At the same time, information on how well the company is performing is made public, helping to increase public trust in the organization.

Green Management Committees

Samsung Electronics recognizes that the environment, safety and health are central to all corporate activities. These considerations are fully reflected in company policies. At the same time, information on how well the company is performing is made public, helping to increase public trust in the organization.

All Samsung Electronics plants have been designated as "Environmentally Friendly Companies" by the Korean government.

Greening of management

Domestic/International Certification, Internationl Cooperation

Samsung Electronics has been granted ISO 14001 certification at all its plants.

The environment and safety are the first considerations in all work processes related to plant organization, products and services. These efforts have been recognized with the international ISO 14001 certification, as well as the Korean government's "Environmentally Friendly Company" designation. Samsung Electronics has also joined the World Business Council for Sustainable Development, the World Semiconductor Council and other international organizations to share information and cooperate with other leading corporations around the world. This effort helps to elevate the standards of environmental safety practiced in Korea.

Overseas Compliance

Samsung Electronics operates a total of 21 production facilities outside Korea. Thus far, four of these plants have received ISO 14001 certification, and two more are expected to be awarded certification by the end of 2000.

ISO 14001 Certification Domestic

Plant Site	Certification Date	Plant Site	Certification Date
Suwon	October 1996	Kumi	November 1996
Kiheung	September 1996	Kwangju	October 1996
Onyang	September 1996	Chunan	June 1999

ISO 140001 Certification Overseas

Country	Plant	Certification Date	Country	Plant	Certification Date
UK	SEMUK	October 1998	China	TSED	August 2000
Malaysia	SDMA	September 1999	Mexico	SAMEX	October 2000
US	SAS	December 2000 (expected)	Brazil	SEDA	November 2000 (expected)

Responding to the Customers' Environment and Safety Requirements

Samsung Electronics freely discloses its environment and safety data to any customers who may wish to review this information. The company will respond to all inquiries regarding hazardous materials in use, how much of these materials are contained in specific products, whether an environment management system is ISO 14000 compliant, or whether materials restricted by international agreements are being used. At Samsung, we will continue to make every effort to satisfy our customers' inquiries.

Greening of management

Comprehensive Control System

Samsung Electronics freely discloses its environment and safety data to any customers who may wish to review this information. The company will respond to all inquiries regarding hazardous materials in use, how much of these materials are contained in specific products, whether an environment management system is ISO 14000 compliant, or whether materials restricted by international agreements are being used. At Samsung, we will continue to make every effort to satisfy our customers' inquiries.

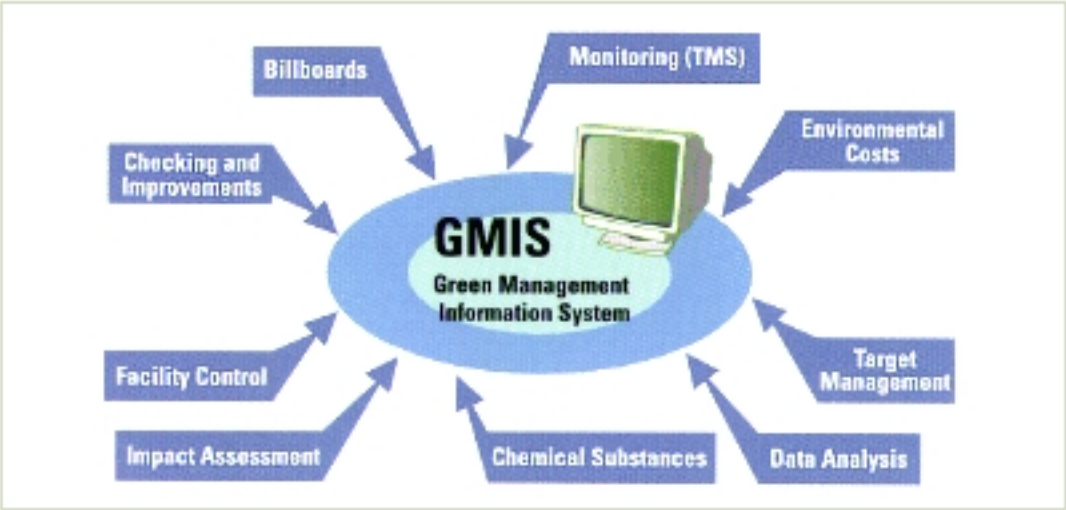
Audits for Systems Improvement

Internal auditors are assessed through special training programs offered by external institutions such as the ISO 14001 certification bodies and the Korean government. These auditors are responsible for correcting problems encountered during the operation of the environment and safety systems. They conduct audits at all Samsung Electronics plant sites.

Process Safety Management

Process Safety Management (PSM) is a scientific and ongoing procedure that deals with all predictable risk factors related with process facilities. At Samsung Electronics, PSM has been first implemented in semiconductor fabrication operations and processes that handle large quantities of toxic and hazardous materials, especially harmful gases since 1997. A process includes any activity related to the handling of raw or sub-materials, from input to output. All potential hazards related to a process are weighed and classified, then addressed in phases to minimize the danger posed by the release of toxic, reactive, flammable or explosive substances. A variety of qualitative and quantitative methods have been employed to assess and analyze the dangers associated with handling large quantities of toxic or hazardous materials. Using these methods,we have identified over 3,000 risk factors, and each of these factors has been thoroughly addressed for each process.

Green Management Information System



The Green Management Information System (GMIS) was built to support the environment and safety program. GMIS provides systematic data on the facilities and substance emissions. It can be used as a way to enhance the company's competitiveness. The development and implementation of GMIS at Samsung Electronics' semiconductor facilities has resulted in:

Greening of management

a. Systematic management of expenses and results from environment and safety programs,
b. Proactive measures to address international environmental restrictions and respond to online business trends,
c. Rapid provision of comprehensive data related to safety and environmental issues.

Infrastructure installation, the first phase of the GMIS project, was completed in 1998. During the developmental phase (October 1999 - February 2000), new functions were added to the system such as: managing the environment and safety cost and performance targets for each division, automatically issuing legally-required reports, and running a program that lists pollution-causing substances and the amounts released into the environment. These additional functions were implemented in March 2000. (diagram) GMIS Functions

Advance Evaluation of Hazardous Raw Materials and Sub-materials

The environmental impact of raw materials and sub-materials used to make products as well as other supplies is evaluated prior to the purchase, and purchase of substances found to be extremely hazardous is prohibited. To ensure greater all-around safety, employee-training programs are provided, while storage and handling facilities are well controlled for substances that require special precautionary measures.

Advance Approval for New Facilities

The environment and safety standards for Samsung Electronics' facilities are reflected in its procurement policy, which addresses these issues at the fundamental levels of new facility design and fabrication. Suppliers must obtain safety certification for their equipment from a third party, and they must submit their inspection results to Samsung Electronics before installation is permitted. At each stage, Samsung will form teams of experts to reconfirm whether the facilities are fully compliant with environment and safety standards. All advance approval documents must be obtained prior to operation startup of any new facility (at Kiheung).

Education and Training

Throughout their careers at Samsung Electronics, employees receive training to heighten their awareness of environment and safety issues. Separate training programs are designed for individuals and for organizational units, and employee performance in these programs is logged onto a database and used in their performance evaluations. Specialized training programs are given to specific job categories to cultivate professionalism and raise overall environment and safety standards. Persons who complete these courses are awarded certificates.

Greening of management

Environment & Safety Experiential Hall

The Environment & Safety Experiential Hall has been opened to improve upon Samsung Electronics' classroom-based education programs. Workers and executives can get a first-hand look at the practical importance of these issues in real life situations. The 180m^2 facility can be used by up to fifty persons at a time, and 70 different safety- and environment-related situations are covered throughout the programs.

Special Awards

Best-practice competitions are held to raise the awareness of the environment and safety company-wide and provide role models. Individuals and organizational units that have made exceptional contributions to the environment and safety issues are selected for special awards at the end of each year. Outstanding specialists in environment and safety management are also cited for special recognition. These awards programs encourage all employees to be more active in Green Management and to constantly improve company's performance in this regard.

Total Responsibility

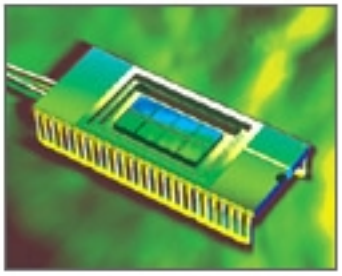
Samsung Electronics was the first in the industry to operate a system for collecting and disposing of consumers' used electronics products. The company voluntarily signed a pact with the Korean Ministry of the Environment to recycle all of the products it sells once their usefulness has expired. This effort not only prevents pollution but also enhances resource utilization.

Total Responsibility

	1996	1997	1998	1999	2000	2001
Units	384,163	378,924	407,115	440,753	451,000	563,000
Weight (tons)	19,208	18,946	20,355	22,037	22,550	28,150

Green Management System

Greening of Products



Minimal impact on the environment is the top priority for all processes related Samsung Electronics products: design, production, distribution, use, and disposal. Samsung has established a system of developing environment-friendly products with consideration for recycling, disassembly, and environmental safety.

Environmental Impact on a Life Cycle of a Business

Introduction 1995-1996

LCA methodology is studied and introduced. A database on basic materials is built. First LCA study is performed on microwave ovens.

Implementation 1997

LCA methodology is applied to find out how to improve environmental aspects of products, LCA studies on TVs, monitors, refrigerators, air conditioners and washing machines are performed.

Implementation 1998

LCA software for product designers is developed, including a database for components. LCA studies on PCs and DRAM chips are performed.

System Construction 1999 - 2000

LCA software for product designers is being upgraded, optimal environmental design procedure is being studied for environment-friendly products, and LCA studies on laser printers and vaccum cleaners were performed.

Life Cycle Assessment

Life Cycle Assessment (LCA) is a scientific tool for evaluating and improving the environmental aspects of all product-related processes. The study of LCA began in 1995, and the LCA on microwave ovens was performed in 1996. LCA studies on TVs, monitors, refrigerators, air conditioners and washing machines were accomplished in 1997 and expanded to desktop PCs, laptop PCs and DRAM chips in 1998. And LCA studies on laser printers and vaccum cleaners were performed in 1999 and 2000 separately.

LCA Software

The Simplified LCA Program for Effective Eco-Design (SPEED) was developed to reduce the time and effort required for performing LCA on products. SPEED provides LCA results of products and components, and supports the development of more environment-friendly products and components. Furthermore, it is environment-friendly software that can be linked with the Bill of Materials used in product development to provide environmental impact of the product in every stage from raw materials to the finished product.

Greening of Products

Environmental Considerations during Design and Development

Reducing raw material consumption by making products more compact (AnyCall): dimensions 79mm x 38mm x 23mm, weight: 79g.

Design for Assembly/Disassembly/Recycling/Service

The Design for Assembly/Disassembly/Recycling/Service (DFA/D/R/S) methodology was first applied to washing machines, TVs, and refrigerators in 1995; to microwave ovens in 1996; vacuum cleaners in 1997; and to monitors in 1998. Application of this methodology continues to be expanded to other products. Software was developed for DfA/D/R implementation and is continually being upgraded. In the future, the software will be linked with CAD systems and used as an essential tool of the product design process.
An example of the successful application of this approach can be seen in our washing machines: The spin basket, or tub, consists of the wrapper (sides) and bowl (bottom), and originally many screws were used to join these two parts. However, the screws made assembly more time consuming, and exposure to water would eventually cause them to rust, making disassembly more difficult once the product was ready for recycling. To resolve this problem, Samsung Electronics improved the design for connecting the wrapper to the bowl (see diagram), thereby reducing the number of screws used by 75%. This change resulted in more efficient assembly, disassembly, and recycling of the washing machine.

Reduction in Packaging Material

Reducing packaging materials saves natural resources and reduces waste. For example, the packaging box for air conditioners was changed to an open-type package, which covers only the top and bottom parts of the product. This kind of package reduces the amount of needed shock absorbent material by 30%. It satisfies packaging requirements while being more environment-friendly.

Environmental Considerations during Production and Use

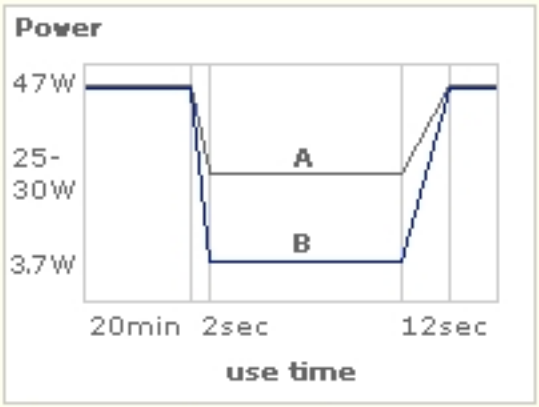
Achivement of Environment and Energy Marks

Samsung Electronics products have been proven excellent in terms of performance and environmental friendliness both at home and abroad. We have been granted a variety of environment and energy marks by authorities around the world.

Energy Saving: the Incredibly Efficient Magic Station (M6200) Computer

Samsung Electronics designed a desktop computer that has earned the Korean Energy-saving Mark because it operates on as little as one-eighth of the power used by comparable models on the market. Electricity consumption is nil for nearly all of the components (CPU, chip sets, optional boards, hard disk drive, CD-ROM drive) when the computer is in power-saving mode. Moreover, the unit can quickly revert to use-mode without having to reboot.

Greening of Products



Ultra Energy Saving Flow

- **A** Energy saving mode of general PCs
- **B** Ultra energy saving mode of M6200

Reduction in Harmful Materials: Discontinued use of CFCs

Samsung Electronics has developed refrigerators and air conditioners that do not use ozone-depleting Freon gases. The company has developed and is now mass-producing air conditioners that use R-407 refrigerant, which will not damage the ozone layer at all. The latest air conditioner units have also been designed to be lighter and less bulky than previous models.
Moreover, Samsung refrigerators now use iso-butane (R-600a), an alternative refrigerant that is completely harmless to the ozone layer and does not contribute to global warming.
These air conditioners and refrigerators are being exported to Europe, where consumers are highly aware of environmental issues. In Europe, the Samsung products have been proven to be excellent in terms of environmental-friendliness.

Environment Marks Granted to Samsung Electronics

Energy-saving marks on Samsung products reflect the company's commitment to protecting the environment, as well as to offering outstanding performance.

US Energy Star Mark:
This mark, which has been approved by the US Environmental Protection Agency, has been awarded to all Samsung Electronics monitors.

European Energy Label:
Samsung's drum-type washing machines have passed the energy saving tests run by Verband Der Elecktrothechnik Elektronik (VDE) and have been awarded the VDE label for compliance.

Korean Energy-saving Marks:
Samsung computers, monitors, facsimile machines, TVs, and VCRs have all received energy marks from the Korean authorities.

European Environmental Marks:
Samsung monitors have been given Germany's Blue Angel as well as Sweden's Nordic Swan and TCO 99 marks for environmental friendliness.

Korean Environmental Mark:
Samsung laser printers and facsimile machines have received the Korea Environmental Mark for their reduced consumption of toner and electrical power.

Greening of Products

Environment-friendly Parts: A Key Strategy in Semiconductor Development

Three strategies are employed in semiconductor design and process development to create new chips that are friendlier to the environment. First, semiconductor functions are enhanced to increase semiconductor density on a single chip. The result is that fewer chips are needed to perform the desired functions, thereby reducing the amount of materials needed and the volume of waste generated during product disposal. This approach has enabled Samsung to go from building DRAMs with a one-megabit capacity to those with 4M, 16M, 64M, 256M and, most recently, 1G capacities. The company has also developed DRAM chips with embedded logic functions that enable them to perform both memory and PC graphics functions. A consequence of these technological advances has been major cuts in energy consumption. Second, an ongoing effort is made to maximize the number of chips that can be fabricated from each wafer. This minimizes the amount of raw and sub-materials needed. The third strategy is to diminish the amount of power used by the ICs themselves. Targets for power consumption are set, and R&D is subsequently carried out to meet those targets.

Developing Environment-friendly Parts: Semiconductors

Lead-free Package

Semiconductors made by Samsung Electronics do not contain lead, an element known to be harmful to the environment. Efforts are also currently underway to eliminate lead from the packaging needed for installing chips in finished products. Basic assessments were completed in 1999, reliability evaluation is to be completed in 2000, and mass production of lead-free packaging is scheduled to start up in 2001. Research has been aimed at developing lead-free plating, solder ball, and solder paste, to decrease the impact of production processes and finished products on the environment.

Chip-sized Packages and Micro Ball Grid Array

Lead-frame plating and protective-film forming processes are needed to improve the electrical conductivity of and protect the circuits on a semiconductor chip. These processes have required the use of an epoxy molding compound (EMC) and various chemicals, which results in the generation of EMC cull and waste acid. To reduce the environmental impact of these processes, Samsung Electronics has replaced the conventional EMC thermosetting resin with a liquid hardening agent for forming the protective film. Moreover, (lead-free) solder ball is used in the lead-frame plating process.

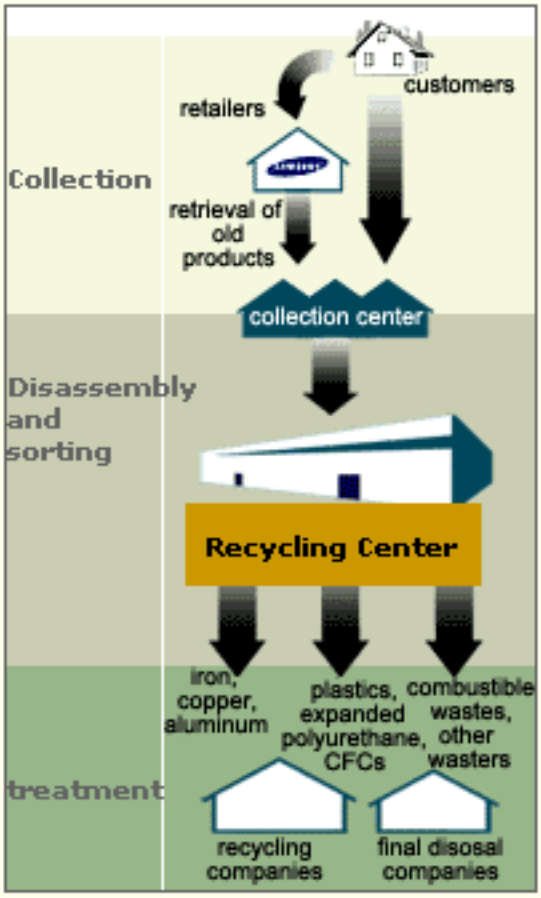
Environmental Considerations at the End of Product Life

Recycling of Used Products

In 1994, Samsung Electronics announced a new set of "customers' rights," which includes the company's responsibility for the gathering and disposal of old household electric appliances. Thus, a system was established for collecting used products and packaging materials. The first Korean recycling center was built in Asan, Choongchungnam-do. The center processes at least 300,000 old refrigerators, washing machines and other items every year. Such materials as iron, copper, aluminum, plastic, expanded polyurethane and CFCs are sorted out for recycling.

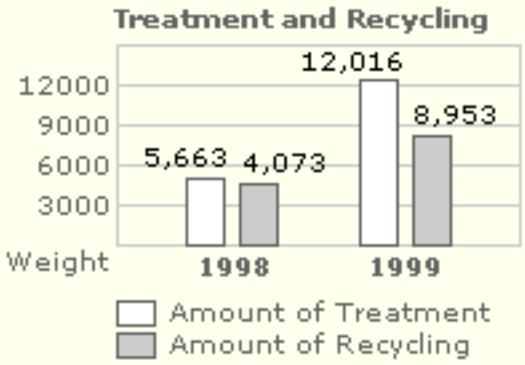
Greening of Products

Collection and Recycling of used products



Recycling of Used Parts

A special system has been constructed for collecting and recycling used toner cartridges used in laser printers. The used toner cartridges are collected at service centers and retailers, then transported to Samsung's own recycling facilities to be processed into high quality recycled toner cartridges.

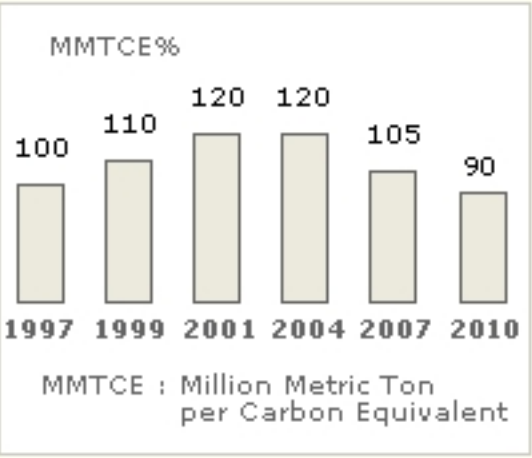


Green Management System

Greening of Processes

The environmental friendliness of all production processes at Samsung Electronics is being constantly improved through a source control program that maximizes the efficiency of raw material and energy use.

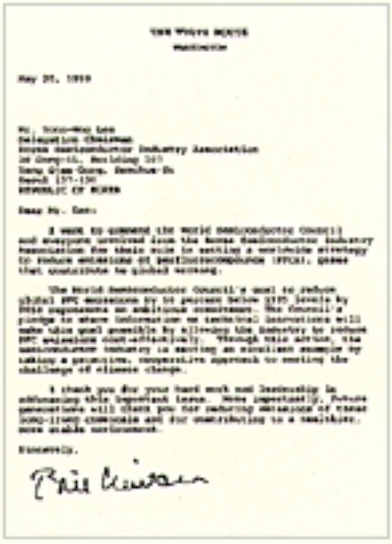
Voluntary Compliance with Protocol on Climate Change



Samsung Electronics is changing over to cleaner burning fuels to reduce emissions of carbon dioxide and Perfluorocompounds (PFCs), both major contributors to the greenhouse effect. The company continues to develop PFC alternatives and to improve utilization processes to help prevent global warming.

Use of Clean Fuels

Bunker C, which has been used as the energy source for heating facilities and powering production processes, is being replaced by clean-buring Liquefied natural gas (LNG). This change is helping to reduce the generation of CO2 and airborne particles.



US President Bill Clinton sends a message of encouragement to Samsung Electronics concerning voluntary efforts to reduce PFC emissions

PFCs Alternatives

Samsung Electronics has voluntarily decided to reduce its emissions of PFCs, which are greenhouse gases. The target is to bring 1997 emission levels down 10% by 2010. In cooperation with the World Semiconductor Council, Samsung is involved in a variety of measures to reduce overall PFC emissions. These include replacing PFCs with substances having less of an effect on global warming, improving process efficiency, and developing facilities for PFC removal or PFC recycling. In recognition of these efforts, US President Bill Clinton sent the company a letter of commendation in May 1999.

The CVD (Chemical Vapor Deposition) process at the Chonan TFT-LCD plant has been upgraded, thereby reducing both the cleaning time and the amount of NF3 gas generated (a PFC) by 23%.

Greening of Processes

Lower Energy Consumption

Each Samsung Electronics plant seeks to lower its energy consumption by 5% a year, and a new Energy Sub-committee has undertaken the task of directing energy-use reduction activities within each division.

Heat generated by the waste incinerators at the Suwon and Kumi complexes is retrieved and used in production processes, thus helping to cut down on energy consumption.

The Onyang plant, which specializes in semiconductor assembly and testing, has lowered its energy consumption by reducing burn-in time (an essential process for testing chip features). Now, efforts are being aimed at cutting CO2 emissions as well as production costs.

In addition, heat exchangers have been installed at each plant site to recover hot gas emissions generated by boilers. As a result, the water flowing into the boilers is hotter, thus lowering overall energy consumption.

Ozone Layer Protection

Chemical substances known to deplete the earth's ozone layer are now banned from company production processes. Alternatives for all Chlorofluorocarbons (CFCs) and Trichloroethylene (TCE) were in use at Samsung Electronics by 1995. Moreover, additional purchases of halon, used in fire extinguishers, were prohibited from 1995.

Water Resource Protection

Samsung Electronics researchers perform tests related to environmental quality.

Maximum Re-use of Industrial Water

Wastewater discharge facilities for each production process have been examined, and detailed analyses have been carried out on the amounts of effluent being generated and the types of substances found in the wastewater. The effluents are classified into one of three grades: (1) reusable as is, (2) reusable after treatment, and (3) not reusable. As a result of these findings, the amounts of industrial water being used and wastewater being generated have been reduced by at least 50%. Moreover, the carefully treated wastewater is all being reused at the plant sites.

Elimination of Water-consuming Processes

Solder paste that generates no residue has replaced the conventional solder paste once used to affix semiconductor chips onto the printed circuit boards. As a result, the water-washing process for removing solder residue is no longer needed. Not only has the product quality been enhanced, but 5,000 tons of industrial water is also being saved each year.

Reduction of Hazardous Chemical Use

The UN's action program Agenda 21 and the OECD Decision have both stressed the need to establish countermeasures to the dangers that chemicals pose to human health and the environment. Samsung Electronics is doing much more than monitoring the amounts of hazardous chemicals being dumped. The company's Chemical Reprocess System (CRS) treats

wastewater from semiconductor processes and recovers the sulfuric acid for reuse. This reduces the amount of sulfuric acid being used by at least 50% and cuts the water needed to wash off the sulfuric acid by 40%.

Upgrading Processes Using Heavy Metals

The lead frame, which is used to attach the semiconductor to the printed circuit board, must be plated with lead or tin to enhance its conductivity and bonding strength. Samsung is developing a lead-free package in response to new environmental regulations in Europe and to improve the safety of the workplace. The company anticipates having the technology to mass-produce all of its semiconductors with lead-free packaging by the end of 2000.

Containers have been changed to eliminate traces of waste lead paste on the printed circuit board. Flux has been replaced (by a more environment-friendly substance) and storage conditions have been altered to free the workplace of lead residue. The result has been less toxic waste produced and less money spent on cleanup (at Kumi and Onyang).

Extended Chemical Life

The lifetimes of the stripper, AI etchant, and MS acid used in plating and LCD etching processes have been prolonged, thereby reducing the volume used and the amount of toxic waste generated.

Green Management System

Greening of Workplaces

Samsung Electronics has instituted internal safety regulations that are far stricter than Korean law, as part of a comprehensive program to prevent accidents and environmental disasters.
Every effort is made to ensure a pleasant, safe, and healthy work environment. For example, an environmental monitoring system is in operation around the clock, and the Samsung Wellness Promotion Plan helps employees stay in the best of health.

Non-polluting Workplaces

Samsung Electronics disposes of all waste materials generated internally at large-scale incinerations, located at the company plants at Suwon and Kumi.

Strict Company Regulations and the Tele-metering System

Samsung Electronics' standards concerning the release of pollution-causing substances are 30% stricter than those of the Korean government are. In addition, a tele-metering system constantly monitors water and air quality at all plant sites. Data on pollution-causing substances are compiled and analyzed in real time, and they are sent to concerned organizations inside and outside the company.

Minimal Waste Generation and Expanded On-site Disposal Capability

Waste material containers are standardized at each work site, and the waste source is classified by container color, as part of a program to minimize waste generation. In addition, the waste is disposed of safely and cleanly at the company's own large-scale incinerators at Suwon and Kumi, Korea. The thermal energy generated by the incinerators is used to heat facilities and run processes.

VOCs Control

Commitment to Clean Technology
Samsung Electronics will continue to purchase or develop clean technology to lower production costs and minimize environmental impact. .These efforts resulted in a savings of $1.9 million in 1999. The company's approach is to link an ever-improving

environmental performance with product manufacture.
Over US$10 million have been invested since 1995 to minimize the discharge of volatile organic compounds, or VOCs. The money has been used to replace the conventional activated charcoal absorption system with a catalytic oxidizer method of VOCs removal. The new method raises removal effectiveness to 95%, while eliminating the waste liquids created during regeneration of the activated charcoal.

Greening of Workplaces

Accident-free Workplaces

An intergrated Disaster Control Center is in operation to keep watch on environment and safety factors, as well as to minimize damage in case of an emergency.

The World's Longest Safety Record

The Environment and Safety Regulations were enacted to instill the importance of environmental and safety concerns in employees and to create an accident-free workplace. All dangerous tasks require advance approval, training is given on identifying dangerous situations, and Environment and Safety Inspection Days are held as part of multifaceted efforts to prevent accidents. As a result, the Kiheung plant went without a single mishap from November 1991 to May 1999, for an unprecedented world record of 234 million hours of accident-free operation.

Environmental Safety Suggestion Program

All employees take part in the Environment and Safety Suggestion Program, through which they can identify risk factors in the workplace. Environment and safety specialists review the employee suggestions, and cash prizes are given for outstanding ideas. These ideas also reflect positively on the employee's work record. Such a system encourages continual improvements in environment and safety issues.

Integrated Disaster Control Center

The Integrated Disaster Control Center is operated to constantly monitor the environment, and safety issues at the plant site, prevent the possibility of fires, explosions, floods and other potential disasters, and minimize any damage in the event that an accident occurs. The Center focuses on dangerous facilities and the most important areas on-site, and disaster response teams are on call. These teams are supported with various kinds of gear, vehicles, and rescue equipment, and they are given mock exercises periodically to keep their skills razor-sharp.

In-house Fire Department

Each plant site has its own fully equipped fire-fighting unit. Their primary duties are to prevent fires and, of course, put them out should they occur at the plant site. These units can also respond to fires and help save lives in the local community if needed.

Greening of Workplaces

Illness-free Workplaces

Work Environment Assessment and Control

The Work Environment Specialist Team is made up of professionals who are supported by the latest measuring devices and detection equipment. Twice a year, they inspect each workplace to check the levels of noise, dust, heavy metals, organic solvents, harmful radiation, and illumination. Their findings are used to improve work methods and to correct problems with machinery to ensure that the workplace is pleasant and safe. Material Safety Data Sheets are provided at the workplace, and regular training is given to machinery operators. Every effort is made to prevent illnesses and accidents resulting from careless handling of hazardous chemicals.

Noise Reduction Activities

With the increase in operational scale and automation, there has been a corresponding rise in the noise levels at manufacturing company workplaces. Samsung Electronics organized a task force in 1997 to find ways to eliminate noise sources at each plant site. Today, Samsung plants are operating an average of 13 decibels more quietly than they were four years ago, thus helping to protect workers and make their work environment more pleasant.

On-site Medical Facilities

Each plant site has its own infirmary, staffed by medical specialists and equipped with basic facilities for diagnosis and treatment. These infirmaries can diagnose common problems and prescribe medicine; they also offer medical counseling. They have ambulances standing by in case of an emergency.

Samsung Wellness Promotion Plan

Under the Samsung Wellness Promotion Plan, employees get regular physical examinations at state-of-the-art medical facilities. Once their condition is evaluated, they are offered an individualized wellness promotion program so that they stay in the best of health. The employees also have access to the on-site Wellness Clinic, where they can follow the exercise routine recommended in their individualized program.

The Samsung Wellness Promotion Plan does more than check on the state of an employee's health. The employees may also practice a workout regimen specially designed to fit their physical condition.

Public Sanitation Control

Bacteria inspections are held for the hot/cold water purifiers, the beverages served on-site, and the vending machines. Food served at the plant cafeteria is meticulously prepared as well to ensure the highest standards of sanitation. In-house disinfecting activities are also carried out in the summer to prevent food poisoning and the propagation of harmful insects.

Health Checkups for Employees and Subcontracted Workers

Samsung Electronics provides physical examinations for not only its own employees but also for its long-term subcontracted workers. These examinations are divided into comprehensive, special, and regular checkups. The comprehensive checkup is performed every other year, while the special, and regular checkups are administered on an annual basis. Through this system, the health of Samsung Electronics' employees and its subcontractors can be carefully monitored to help them maintain a high quality of life. (this part was already done)

Green Management System

Greening of Communities

Samsung's business philosophy stresses "co-existence and co-prosperity." In line with this ideal, Samsung Electronics provides its subcontractors with technical support and environment safety troubleshooting services. The company also is involved in community service programs related to environmental preservation. In this way, Samsung Electronics maintains a green partnership with the local communities in which it works.

Environmental Preservation Activities

Samsung Elecftronics' environmental programs are also carried our overseas. Renggeng Park in Malaysia was renamed "Samsung Park" in recognition of Samsung employees' efforts to restore its natural beauty.

Every year, over 5,000 people visit Samsung Electronics to tour its environmental protection facilities and to learn about the company's environmental management policies. Pictured here is an environmental booth.

Samsung Electronics sponsors a variety of special activities to make people aware of how serious pollution problems are and how important environmental preservation is to us all. Among these activities are the Green Home Concert and the Save Our Rivers Environmental Photo Contest.

Adopt-a-Mountain, Adopt-a-River Clean-up at Each Work Site

Each plant designates a river and a mountain in its vicinity for periodic clean-up drives. At the same time, the company cooperates with non-government environmental groups in campaigns to clean up the Han River (which flows through Seoul) and the Nakdong River (which flows through Pusan). For these projects, Samsung Electronics has donated boats for use in the clean-up, operates a bicycle patrol team that monitors the Han River environment, organizes drives with specific clean-up themes, and sponsors Han River photo contests.

Open Environment and Safety Management

Samsung Electronics allows many different classes of people--including government officials, civic groups, corporate employees, teachers, schoolchildren, and local citizens--to look at its environmental safety case studies and related facilities. Thus, the company's operations can serve as a place of instruction on environmental and safety issues.

Greening of Communities

Investigations of Local Eco-systems

Special probes of the ecology of the Han River basin and economic zone around the city of Suwon are conducted with the participation of non-government environmental groups, and schoolchildren from primary, middle and high schools. These outings provide an opportunity for the participants to learn about local cultural sites as well as write reports on ecological preservation, water quality, and aquatic animals and draw environmental maps. They learn about nature and cultural properties first-hand and gain a greater sense of the need to preserve these treasures. Since 1990, Samsung Electronics has also been cooperating with Korean bird protection societies to study wildfowl habitat and help to preserve endangered bird species.

Environmental Events

Samsung Electronics has held the Green Home Concert since 1994. More recently, the company has initiated regularly scheduled events to protect fireflies and feed birds (near the DMZ?), organized the Green 2000 marathon, exhibited recycled products, and sponsored cleanups of historical sites. These events help raise public awareness of environmental protection issues.

Green Home Concert

Samsung Electronics has held the Green Home Concert since 1994. The event brings families together to enjoy a night of music sung in praise of the beauty of nature.

Each plant assumes the responsibility to clean up one mountain and one river periodically. Pictured here is a boat donated by Samsung Electronics to an effort to clean up the Han River

Regional Agenda 21

The Regional Agenda 21 is a forum for discussing environmental problems and offering solutions to those problems at the local level. Local government organizations, academics, journalists, civic groups, and business people participate in these discussions, which Samsung Electronics helps to organize.

Artificial Wetland

Samsung Electronics and the Green Kyonggi 21 Organizing Committee plan to build a natural wetland at the Green Center (waste water treatment facility), on the Samsung Electronics Kiheung complex site. The project is being conducted in cooperation with local citizens, who have been invited to submit their suggestions during the planning stages. A sketching contest was also held in conjunction with the project.Effluent treated at the Green Center will be discharged into the wetland and the impact on local fauna and flora will be closely studied. The species of plants and tree prevalent in the area will be planted in the artificial wetland for impact assessment, and the surrounding eco-system will be monitored as well.

Greening of Communities

Designation of Environmental "Sister" Schools

Each Samsung Electronics plant forms "Sisterhood" ties with local primary and middle schools. Through this relationship, the company carries out various activities, such as essay contests with an environmental theme, slogan and poster contests, local clean-up drives, awards for model students, and scholarship programs.

Ecology Research Projects with Academia

Samsung Electronics and Kyunghee University are jointly involved in research to ascertain the degree of local pollution and the heavy metal of the dust in the Suwon area, as well as to study ecological changes to and kinds of pollution in Osan River and Singal Lake. The company is also researching the Wonchun River ecology in cooperation with Aju University and the Suwon Center for Environment Movement. Local citizens and environmental groups are invited to symposiums where the research findings are presented and discussed, as part of efforts to preserve ecology in Korea's provincial areas.

Sopport for Environment and Safety Control at Subcontractors

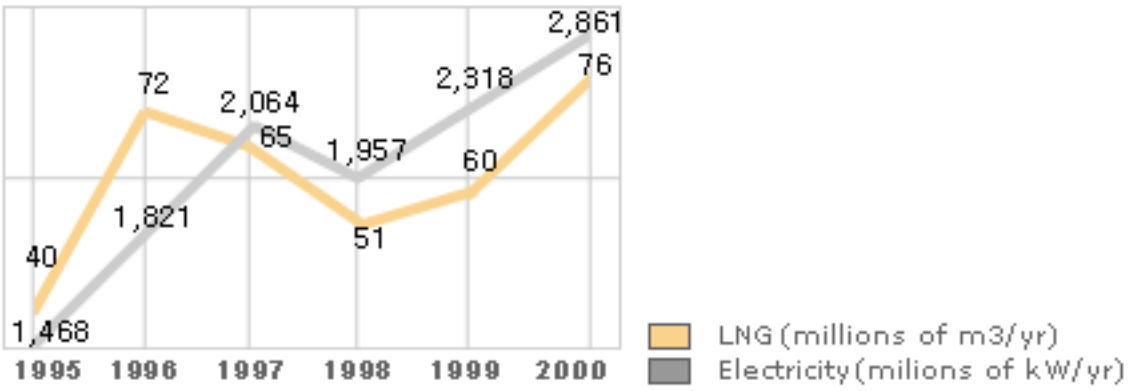
Samsung Electronics conducts environment and safety inspections at its subcontracted suppliers at least twice a year. Once the overall problems related to the environment and safety are known, guidance and advice are provided. Samsung Electronics dispatches teams to offer periodic technical support and provides various training programs on improving environment and safety practices. The subcontracted companies are given reference materials, their environment and safety engineers receive special training, and their top managers attend special seminars held by Samsung Electronics. Samsung will also help its subcontractors to obtain ISO 14001 certification and the "Environmentally Friendly Company" designation.

Rescue and Relief Activities in Local Communities

Rescue Unit 3119 is the Korea's first civilian rescue organization to receive an official government designation. The Unit was established in 1995 to lend a helping hand in times of disaster. Since then it has even been dispatched overseas. The rapid response of Rescue Unit 3119 has helped to save lives and to minimize damage. Members performed brilliantly during such events as the earthquake in Kobe, Japan; the Sampoong Department Store collapse in Seoul; the major fire at Kwangmyung city; the floods in Kyonggi and Kangwon Provinces, and the oil spill off Korea's South Coast.

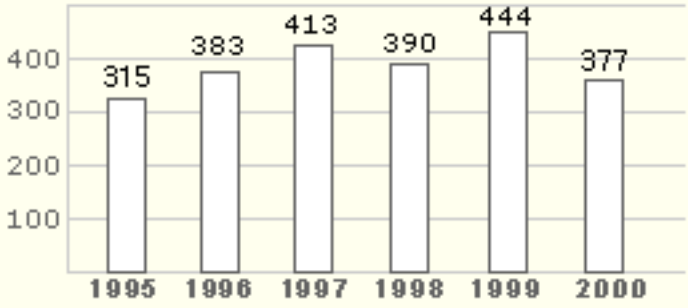
ESH Indicators of Performance

Energy Concumption



CO2 Emissions

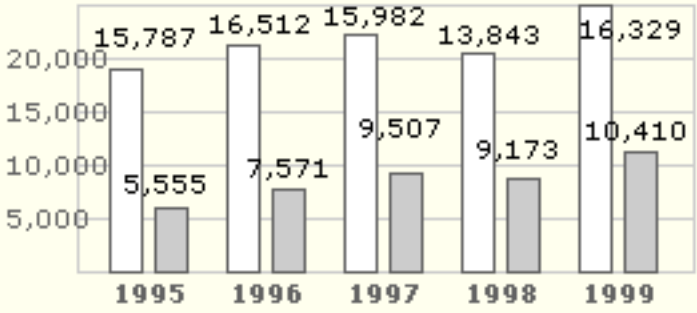
(thousands of tons/yr)



CO2 Emissions depend on energy consumption

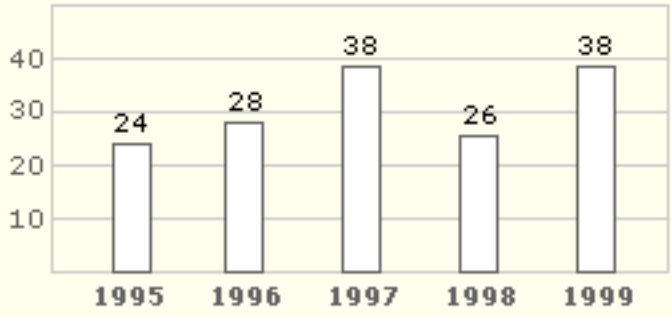
Water Consumption

(thousands of tons/yr)



Toxic Materials

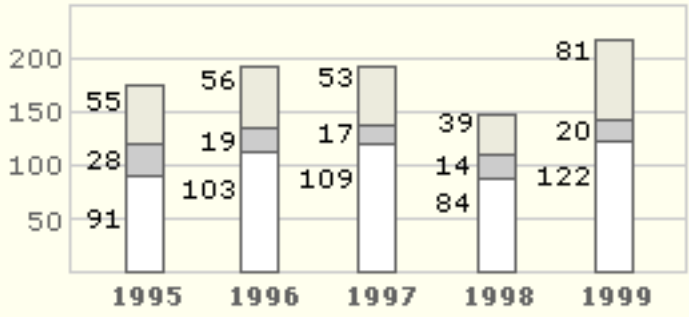
(thousands of tons/yr)



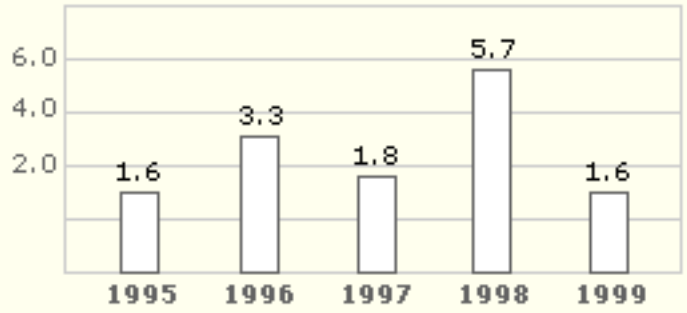
The amounts are totals of 12 chemicals used at Samsung Electronics.

Waste Disposal

(thousands of tons/yr)



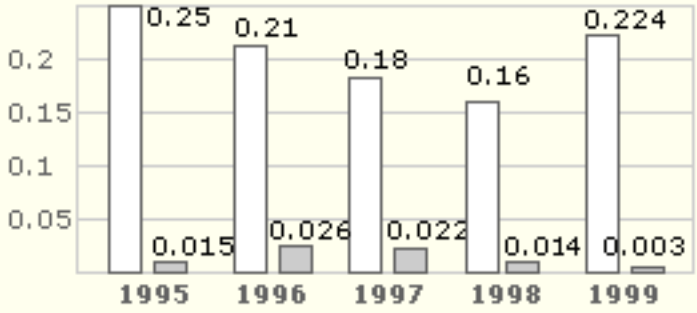
Environment Investment Rate



$$\frac{\text{Environment Investment}}{\text{Facilities investment}} \times 100$$

Employees' Accident Rate

(%) Accident rate in electronics



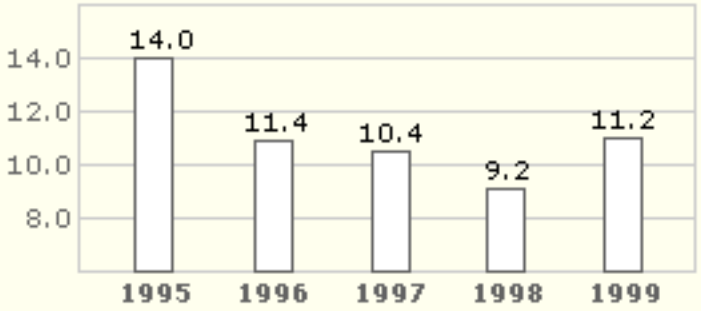
Accident rate at Korean electronics industry (average)

Accident rate at Samsung Electronics

$$\frac{\text{No.of people in accidents}}{\text{Total no. of employees}} \times 100$$

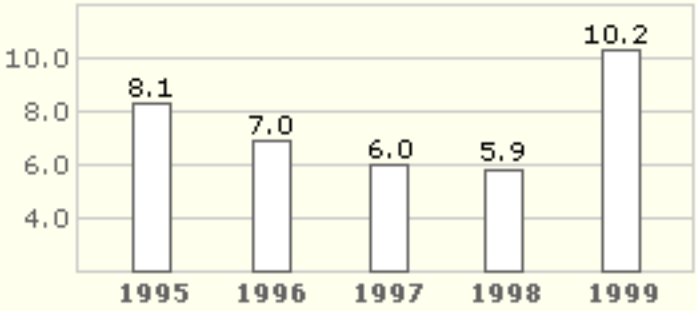
COD

(ten of tons/year)



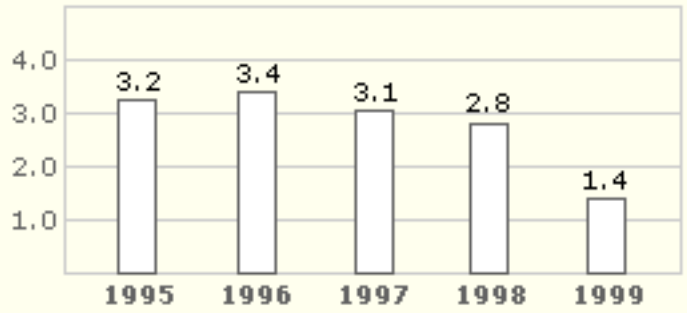
SS

(ten of tons/year)



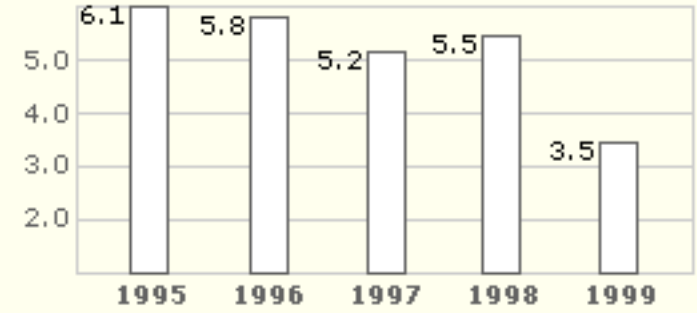
SOx

(ten of tons/year)



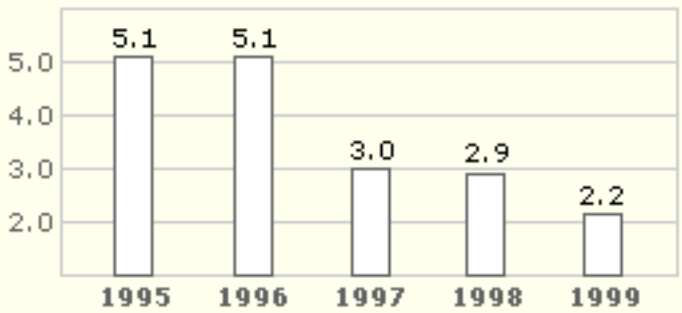
NOx

(ten of tons/year)



Dust

(ten of tons/year)



Continual Improvement

All possible environmental preservation activities will continue to be carried out in 1999. These activities will be comprehensive and cover all product processes, including development, production, sales, distribution, and disposal. The effort will be based on a mid-term plan that extends until 2003; performance will be evaluated each year, and the result will be made public.

Greening of Management

The ISO 14001 certified systems will be maintained at all plants and further developed to incorporate any possible improvement. ISO 14001 certification will steadily be expanded to overseas plants as well. The Environment Management System is currently being adopted at four of these plants (TSED in China, SAMEX in Mexico, SEDA in Brazil and SAS in the US) and all are expected to be ISO 14001 certified by the end of 2000. A Green Management index and environmental accounting system will be developed. Green Management results will be evaluated annually, and a report will be issued. A green purchasing system will also be adopted in which environment-friendly parts and materials will be the top priority.

Greening of Products

Life Cycle Assessment (LCA) and Design for X (DfX) will be employed to continuously decrease the environmental load and enhance product environmental friendliness. To stay in step with new regulations banning the use of lead, mercury, and other hazardous materials, Samsung Electronics is developing lead-free soldering and non-halogen plastics. The conventional LCA and DfX tools will also be improved with environmental implications considered for all processes, thus establishing an integrated Design for Environment (DfE) approach. In addition, Samsung is collecting old electronic products for recycling to maximize resource utilization. In 2000, an LCA program will be completed for vacuum cleaners and a list analysis database will continue to be compiled. By 2002, Samsung will be able to employ LCA with all products from their design stage onward through production. Furthermore, the Design for Assembly/Disassembly/ Recycling/Service program will be upgraded and the improved DfA/D/R/S applied to test products in 2000 and expanded to all products during 2001

Greening of Processes

Efficiency of energy use will be improved by 5% a year. This effort will improve corporate competitiveness and help to preserve precious natural resources. During 2000, the use and emission volumes of perfluorocompounds (PFCs), which have high global warming potential, will be carefully analyzed and strategies devised to reduce overall PFC levels. Their use in semiconductor production processes will be reduced 10% from 1997 levels by 2010. The refrigerant HCFC, which is an ozone depleting compound, will steadily be replaced by safer alternative substances. Ongoing efforts will be made to reduce the use of industrial water (at least 3% a year) and energy (at least 5% a year). 10% less water will be consumed in 2001 than in 1997, and the figure will be reduced another 10% by 2003.

Greening of Workplaces

A pleasant work environment will be maintained by continual improvements in working conditions and safety activities. The Employee Wellness Promotion Plan will continue to be developed, while medical facilities and exercise equipment will be further improved.

Greening of Communities

Samsung Electronics takes part in Regional Agenda 21 and will continue to engage in activities aimed at addressing the environmental concerns of local communities. Samsung joins with local citizens, academia, government and non-government organizations and other companies in support of nature conservation programs such as the Save the Firefly campaign at Mt. Kwangkyo in Suwon. An artificial wetland will be constructed in 2000, while an ecology park for educational purposes is scheduled for completion in 2003. The park will be open to local citizens and students. Support will also be given to our suppliers so that they can improve the greening of their operations.

Green Management Performance

Message from Management Performance of the Samsung Electronics Green Management Program

Samsung Electronics issued a company-wide Green Management Report in 1999. This publication is a step forward, for it integrates the contents of reports that were previously put out separately by the six production sites in Korea.

The Samsung Green Management program was unveiled in May 1996, and since then, Samsung Electronics has accomplished much in terms of environmental, safety and health issues. At the same time, our corporate competitiveness has been enhanced from the greater energy efficiency and cost-cutting benefits of the program. In spite of adverse business conditions during 1999, we managed to expand Green Management systems. Our effort to free the workplace of accidents, pollution and illness have continued as have our support for subcontractors and our programs to preserve the environment of local communities. Significant progress has also been made in applying clean technology to production processes and to enhancing the environmental friendliness of our products.

For example, we have maintained ISO 14001 compliance at all our production complexes in Korea, and our plant in Malaysia was ISO 14001 certified for the first time in 1999. We began a concerted effort to establish Green Management systems at other overseas operations as well. Moreover, the Monitor Division received European environmental marks while the Printer Division was awarded the Korean environmental mark. These accomplishments are noteworthy and can now be incorporated into our marketing campaign to promote environment-friendly products.

In the future, Samsung Electronics must adopt an Environmental Performance Evaluation program for organizations and systems. I believe we have to develop environment-friendly products and processes on the basis of life cycle assessment and we must make the environment a major marketing theme. In this connection, an environmental accounting system needs to be adopted. We must also pass our experience in environmental management on to our subcontractors to build a framework for mutual survival.

Ultimately, Samsung Electronics must raise corporate value through Green Management. We must also be ready to humbly accept the advice and criticisms of all interested parties if we are to achieve sustainable growth in the 21st century.

Jong-shik Park, Senior Executive Managing Director
Samsung Global Environment Research Center

Certificates and Awards

Presidential Prize for Outstanding Environmental Management

May 1995	Presidential Citation for Outstanding Productivity
Aug. 1995	Designated as Korea's first "Environmentally Friendly Company"
Nov. 1995	Industrial Safety Grand Prize
Sep. 1996	Became world's first semiconductor maker to be ISO14001 certified
Feb. 1997	Designated Outstanding Enterprise for Safety and Health
Apr. 1997	Presidential Citation on Disabled Persons Day
May 1997	Presidential Citation at Quality Globalization Advancement Conference
Nov. 1997	Prime Minister's Prize for Energy Conservation
Nov. 1998	Presidential Prize for Outstanding Environmental Management
May 1999	The world's longest safety record achieved (211.6 million accident-free labor hours)
Jun. 1999	Environmental Management Grand Prize
Jun. 1999	The Order of National Service Merit Magnolia Badge

Contact Points

ESH Office
address San-24, Nongsu-ri, Kiheung-eup Yongin, Kyongki-do,Korea
tel 82-31-209-7143
fax 82-31-209-7446

Suwon Plant
address #16,Naetan3-dong, Paldal-gu Suwon, Kyongki-do,Korea
tel 82-31-200-1964
fax 82-31-220-1917

Kiheung Plant
address San-24, Nongsu-ri, Kiheung-eup Yongin, Kyongki-do,Korea
tel 82-31-209-7151
fax 82-31-209-7446

Onyang Plant
address San-24, Buksu-ri, Paebang-myon Asan, Chungcheongnam-do,Korea
tel 82-41-540-8801
fax 82-41-540-7049

Kumi Plant
address 259, Kongdan-dong Kumi Kyungsangbuk-do,Korea
tel 82-54-460-2200
fax 82-54-460-2120

Kwangju Plant
address 217, Osun-dong Kwangsa-gu, Kwangju, Korea
tel 82-62-950-6070
fax 82-62-950-6070

Chonan Plant
address San 33-11 Sungsung-dong Chonan Chungcheongnam-do, Korea
tel 82-41-529-6700


SAMSUNG
ELECTRONICS