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Environmental Report 2000

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Oki is actively developing global environment and local environment conservation activities in all company operations to provide products which contribute to the advancement of the information society.
(Environmental philosophy)



Contents

Greeting.....	2	• Management and Reduction of Chemical Substances	13
Environmental Policy and Organization	3	• Pollution Prevention	15
Progress of Environmental Protection Activities	4	• Water Resources and Green Conservation	16
Eco Plan 21 and Achievements in Fiscal 1999	5	Establishment of Environmental Management System	17
Environmental Management System Overview.....	6	Environmental Information Disclosure.....	18
Environmental Protection Program		Environmental Education and Motivation.....	18
• Environmental Impact Reduction in Product Design	7	Environmental Accounting	19
• Recycling of Used Products.....	9	Social Contribution Activities.....	21
• Recycle of Used Packaging and Packing Materials.....	9	• Nature preservation activities	
• Development of Eco-friendly Products.....	10	• Regional community contribution programs	
• Reduction of Industrial Waste and Reuse of Resources... 11		External Awards	22
• Energy Conservation Program	12	Ok! Group Companies Environmental Protection Activities ...	23

Corporate Summary

Company name: Oki Electric Industry Co., Ltd.

Founded: January 1881

Company established: November 1, 1949

Capital: JY67.8 billion (as of March 31, 2000)

Number of employees: 8,760 (as of March 31, 2000)

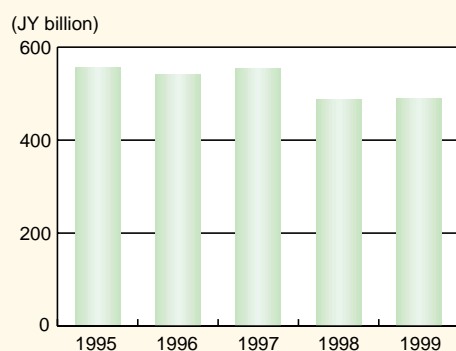
President and C.E.O.: Katsumasa Shinozuka

Corporate headquarters: 1-7-12 Toranomon,
Minato-ku, Tokyo, Japan

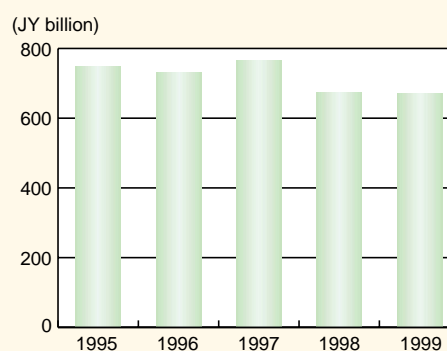
Main product segments: Telecommunication systems,
information processing systems
and electronic devices

Affiliated companies: 69 consolidated subsidiaries

Net sales (corporate)



Net sales (consolidated)



- This report has been prepared based on the information, records of programs and activities of Oki Electric Industry Co., Ltd., as well as its affiliated group companies for the fiscal year 1999 (April 1, 1999 through March 31, 2000). The report shall undergo future updates.
- Information concerning environmental issues are derived from Oki group companies, which includes Oki Electric and affiliates that have had a significant impact on the environment.

Data category	Group companies (other than Oki Electric) included in the data
Industrial waste and electrical power consumption	Miyazaki Oki Electric Co., Ltd. and Miyagi Oki Electric Co., Ltd.
Pollutant Release and Transfer Register (PRTR) recorded amount	Miyazaki Oki Electric Co., Ltd. , Nagano Oki Electric Co., Ltd. , Miyagi Oki Electric Co., Ltd. , Oki Data Corp. , Shizuoka Oki Electric Co., Ltd. , and Gunma Oki Techno Co., Ltd.
Packaging and packing materials	Nagano Oki Electric Co., Ltd. and Oki Data Corp.

Greeting

**Katsumasa Shinozuka,
President and C.E.O.**



The environmental issues are serious problems common to the world today. Efforts to seriously tackle the environmental problems and to change society into a recycling society, are issues common to all of humanity.

Oki's environmental philosophy, established in 1999, states: "Oki is actively developing global environment and local environment conservation activities in all company operations to provide products which contribute to the advancement of the information society." Based on this policy, we have been conducting activities for the environmental protection in all areas of business, from research and development through to waste disposal and recycling.

Since 1970, we have been performing pollution prevention activities. Activities to improve global environmental problems started with the establishment of the "Environmental Protection Activity Plan" in 1993, followed by the "Environmental Protection Activity Plan 96" established in 1996 as the second stage. All Oki group companies have been collaborating in these activities.

In order to assume more social responsibility, the "OKI Eco Plan 21" was established in 1999 as a critical corporate management agenda, resulting in aggressive efforts in new environmental protection activities. Aside from the existing reduction of the environmental impact carried out at plant locations, the characteristics of this plan are its strengthening of the development for eco-friendly products, as well as positive information disclosures, which involves the entire Oki group.

Results from this plan, for the fiscal year 1999, include the establishment of the Recycling Center which made possible the target for recycling rates for used products at a date earlier than scheduled, as well as surpassing the targeted figures for the fiscal year in most of these activities. We have also eliminated all waste incineration facilities as a part of dioxin problem risk management.

Details of activities in FY1999 are provided in this report as well as an Environmental Accounting, which was newly implemented in the same period.

Oki group companies will continue to strengthen the efforts in environmental protection activities. We hope that this report will be of assistance to improve your understanding of how Oki group companies are conducting activities to tackle environmental problems.

Environmental Policy

Oki established its basic environmental policy in 1996. Environmental protection activities are being carried out, based on this basic policy.

1. Basic Environmental Policy

Environmental philosophy

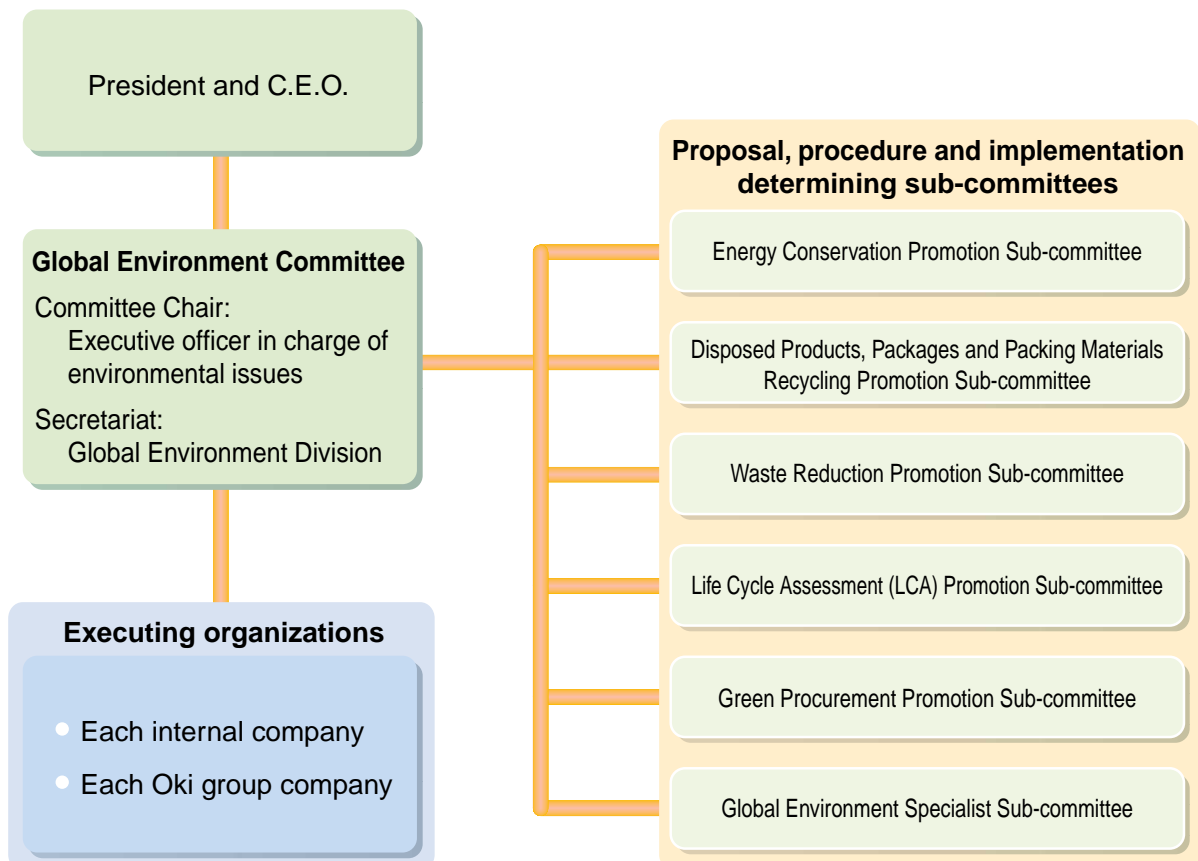
Oki is actively developing global and local environmental conservation activities in all company operations to provide products which contribute to the advancement of the information society.

Activity guidelines

- 1) To provide environmentally friendly products by evaluating, in the development and design stage, the environmental effect of all stages, from development to disposal of a product.
- 2) To save resources, conserve energy, and decrease waste by using environmentally friendly technologies, in and outside Oki.
- 3) To decrease environmental burdens by voluntarily deciding on improvement activity plans in addition to adhering to the environmental regulations of the national and local governments.
- 4) To continuously improve the system and achievements by properly maintaining the PDCA of the environmental management system.
- 5) To develop environmental conservation activities for the Oki group, to include affiliated companies in and outside Japan.

2. Activity promotion organization

The environmental programs and activities of Oki are being carried out by the following organization:



Progress of Environmental Protection Activities

	Corporate programs and activities		Global trends	
1970s Year			1967	Anti Pollution Basic Measures Law is enacted.
			1968	Air Pollution Control Law is enacted.
	Nov. 1970	Environmental pollution countermeasure project team established at corporate headquarters.	1970	Water Pollution Control Law is enacted.
	Oct. 1971	Pollution prevention and management regulations are established.	1971	Environment Agency is established.
	Sept. 1973	An environmental protection special section is established within Oki Engineering Standard (OES) Deliberation Committee.		
	June 1979	Environment audit begins at Head Office.		
1980s Year			1988	Montreal Protocol comes into effect.
	May 1981	Environmental audit begins at affiliated companies.		
	April 1983	Environmental Management Regulations are established.		
	April 1984	Environmental Management Standard (OPES) is established.		
	Aug. 1988	Specified particular chlorofluorocarbon reduction activities begin.		
1990s Year	Sept. 1990	1,1,1-trichloroethane, trichloroethylene, and dichloromethane reduction activities begin.	1991	Federation of Economic Organizations establishes the Global Environment Charter. Recycle Law is enacted.
	March 1993	Oki Environmental Protection Activity Plan is established.		
	March 1993	Specified particular chlorofluorocarbons are totally eliminated.	1991	Global Summit is held.
	Sept. 1993	1,1,1-trichloroethane is totally eliminated.	1992	Basic Environment Law is enacted.
	May 1995	An advance evaluation system for the environmental influence of product design and packaging is established.	1993	Treaty of the Framework Convention on Climate Change comes into effect.
	Dec. 1995	ISO 14001 certification plan is announced to the press.	1994	Basic Environment Plan is announced.
	Aug. 1996	"Basic Environmental Policy" and new "Environmental Protection Activity Plan" is established.	1994	Container Package Recycle Law is enacted.
	Feb. 1997	Miyazaki Oki Electric Co., Ltd. becomes ISO 14001 certified.	1995	Environmental Appeal of the Federal of Economic Organizations is established.
	March 1997	Trichloroethylene and dichloromethane are totally eliminated.	1996	ISO 14001 comes into effect.
	July 1997	Hachioji area becomes ISO 14001 certified.	1996	Environment Assessment Law is enacted.
	March 1998	Oki's major production sites become ISO 14001 certified.	1997	Amendment of Waste Management & Public Cleaning Law is enacted.
	Dec. 1998	Major production sites of Oki group companies become ISO 14001 certified.	1997	Third session of the Conference of Parties (COP3) is held in Kyoto.
	Feb. 1999	Miyagi Oki Electric Co., Ltd. is awarded the Director General's Award in the Superior Energy Management Factory category, given by the Agency of Natural Resources and Energy.	1998	Home Electric Appliance Recycle Law is enacted.
	March 1999	Company standards for the "Green Procurement Guidelines" are established.	1999	Pollutant Release and Transfer Register (PRTR) Law is enacted.
	July 1999	Used Product Recycling Center is established at the Honjo area.		
	Aug. 1999	"OKI Eco Plan 21" is established.		
	Sept. 1999	"1999 Environmental Report" is issued.		

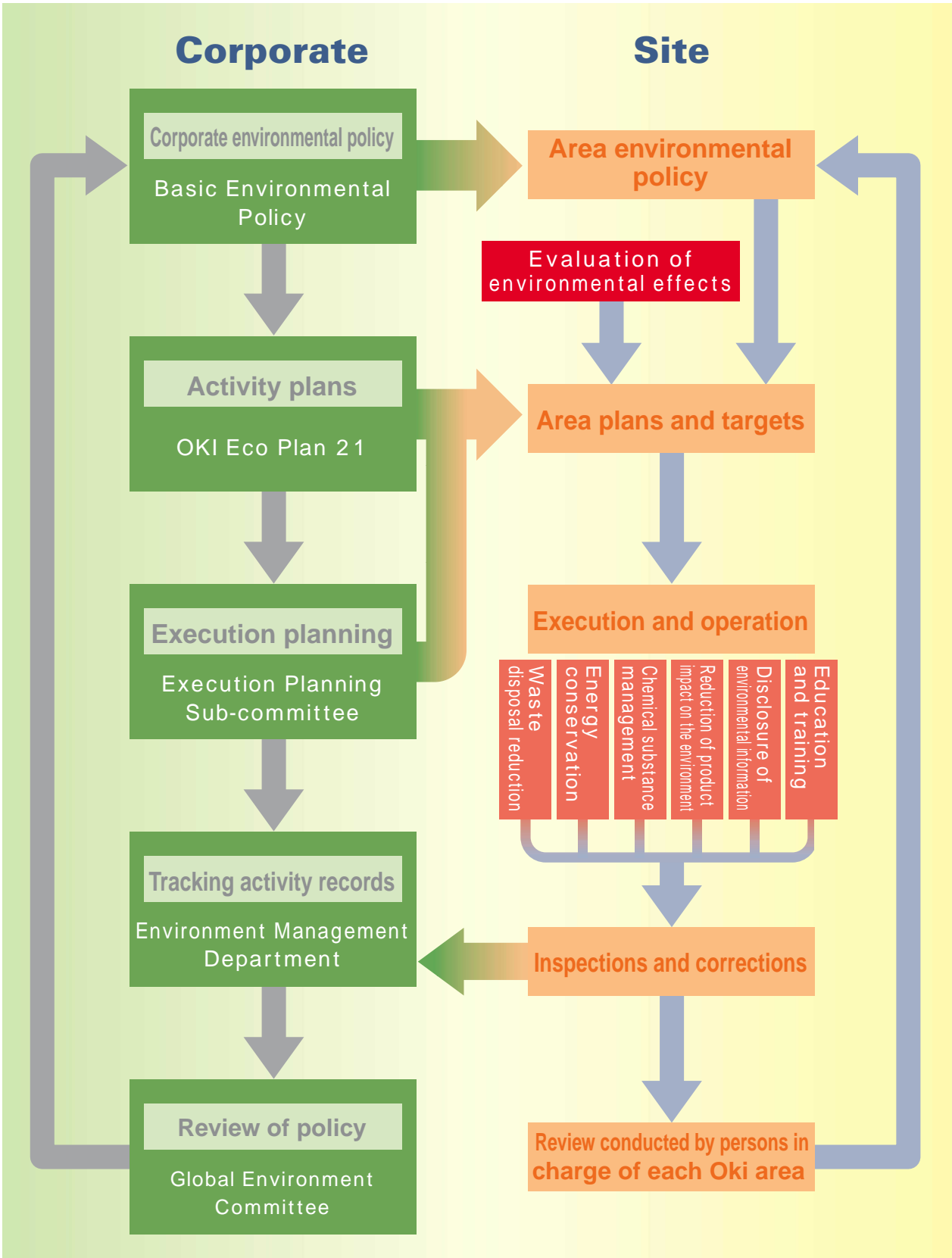
Eco Plan 21 and Achievements in Fiscal 1999

In 1996, Oki established the "Environmental Protection Activity Plan," a voluntary plan for environmental activities. Since almost all targets of the plan were achieved, a review was carried out and as a result, "OKI Eco Plan 21" was established in 1999. The environmental protection activities of Oki are based on this plan.

Category	Description	Target (Eco Plan 21)	1999 activity
Global warming countermeasures Electric power usage reduction	Electrical	power consumption (energy consumption) is to be reduced by 10% of the total for FY1995, by the end of FY2000.	16.8% reduction (target achieved).
	CO ₂ emission reduction	The CO ₂ emission (by energy consumption rate) of all energy consumed is to be reduced by 10% of the total for FY1995, by the end of FY2000.	15.9% reduction (target achieved).
Countermeasures for the overloading of final waste processing plant	Reduction of industrial waste	The quantity of waste sent to the final waste processing plants is to be reduced by 70% of the total for FY1997 by the end of FY2000. Resource recycling rate is to be increased to 90%, by the end of FY2000.	63% reduction. Resources recycling rate: 90% (target achieved).
	Used products recycle rate improvement	Used product recycle rate is to be increased to 92%, by the end of FY2002.	Used product recycle rate: 95% (target achieved).
Eco-friendly product developments	Possible recycling rate (design stage) improvement	Possible recycling rate is to be increased by 30% of the total for FY1995, by the end of FY2000.	Possible recyclable rate: 31.2% (target achieved).
	Markings for rating environmentally consciousness classified products	All major products to be marked by the end of FY2000.	A promotion committee established.
	Implementation of life cycle assessment (LCA)	Implementation of LCA to all major products by the end of FY2001.	LCA promotion subcommittee established.
	Expansion of green procurement activities	Start green procurement by the end of FY2001.	Green Procurement Promotion Subcommittee established.
Environmental management system	Increase of ISO-14001 certified sites.	All uncertified production sites are to obtain ISO-14001 certification by the end of FY2001.	Activities carried out for the certification.
Information disclosure	Environmental report disclosure	Environmental report disclosed from 1999.	Disclosure made in September 1999.
	Environmental accounting disclosure	Environmental accounting disclosed from 2000.	Disclosure made in the Environmental Report 2000.

Environmental Management System Overview

A diagram of the environmental management system of Oki is shown below. Oki has established an environmental management system and shall continue to conduct voluntary environmental impact reduction programs and activities.



Environmental Protection Program

Environmental impact reduction in product design

Every product has an impact on the environment, from its production through to the disposal stages and throughout its life cycle which can extend for a long period of time. Oki is conducting environmental impact reduction activities with the entire product life cycle.

1. Execution of product assessment

In order to reduce the impact of a product on the environment, it is necessary to evaluate the environmental impact caused by the product throughout its life cycle and then incorporate as much improvement as possible, during the design stage, in all aspects including energy conservation, resource conservation and recycling characteristics.

To this end, the Product Assessment System was established in 1995. This system calls for evaluation of products in 11 categories and 22 items shown in the table during the product design stage. The evaluations are numerically specified and recorded and if the records do not meet a set standard, redesign or design changes are implemented.

In FY1999, 37 products including automated teller machines (ATM), OA equipment, switching systems, communication terminals and water leakage detectors were put through this Product Assessment System.

2. Promotion of green procurement

In order to reduce the impact products have on the environment, it is essential that the purchased parts and materials' environmental impact be reduced. In order to make this possible, we have asked and received cooperation from our vendors, in the investigation of toxic substances contained in products, parts and materials delivered to Oki. The investigation, involving 107 vendors (approx. 20,000 items), was completed by FY1999. The data collected through this investigation will be put into a database, which will be used to reduce the use of toxic substances during product development.

Examples of the verification of product assessments

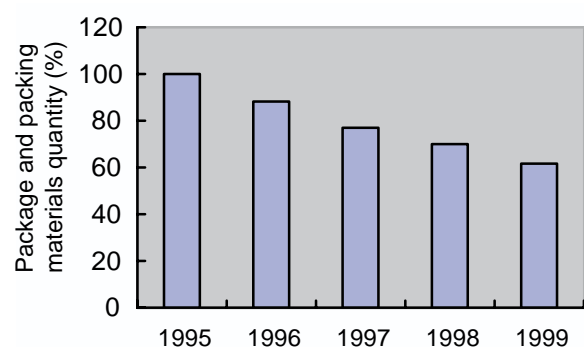
Category	Item
1. Recycling characteristics	3
2. Ease of disassembly/separation of parts/materials	3
3. Ease of separation according to material types	2
4. Reduction in product size and weight	2
5. Utilization of recycled resources	2
6. Promotion of recycled resources	1
7. Durability of products and parts	1
8. Energy consumption	3
9. Ease of collection and transportation	1
10. Safety in processing	2
11. Avoidance of polluting substances	2

3. Reduction of package and packing materials

The package and packing materials constitute approx. 60% of the overall waste materials by volume. Reduction of these materials has become an issue.

Oki established a package and packing materials assessment system in 1995 and through this system is striving to reduce package and packing materials used for its products.

In FY1999, 37 products, including automated teller machines (ATM), OA equipment, switching systems, communication terminals and water leakage detectors, have been put through this assessment system and a reduction of 9% over the previous year was achieved.



4. Execution of life cycle assessment

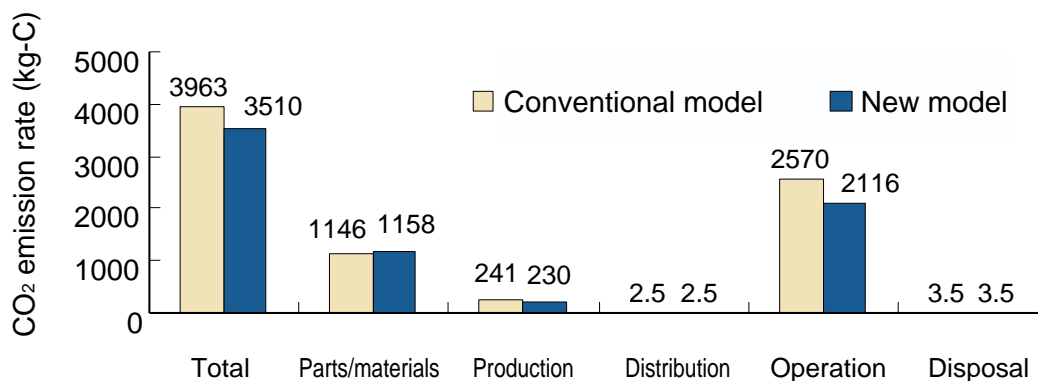
A life cycle assessment (LCA) is an effective means to understand the impact of a product or service on the environment throughout its entire life cycle. It is a process, wherein a quantitative calculation of the entire life span of a product or service, from production through to disposal (a life cycle), is made in terms of materials and energy to evaluate the effects on the environment.

LCA was performed on automated teller machines (ATM) in FY1999. As shown in the graph below, the CO₂ emissions (calculated by carbon quantities) of new models was reduced by 12% over conventional models.



ATM

This evaluation result will be used to reduce the environmental impact by new products.



CO₂ emission rate obtained through LCA for ATMs

5. Establishment of Green Procurement Promotion Sub-committee and LCA Promotion Sub-committee

In order to conduct green procurement and LCA, it is necessary to consider the centralization and sharing of methods and databases for the entire company. In order to make this possible, "Green Procurement Promotion Sub-committee" and "LCA Promotion Sub-committee," spanning the entire corporate organization, were established.

Recycling of Used Products

In order to create a resource recycling society, it is necessary to use resources efficiently and reduce the amount of disposed materials. Oki has set the following targets and is performing activities for the recycling of used products.

Target: Increase the recycling rate of used products to 92% by the year 2002.

1. Recycling rate of used products

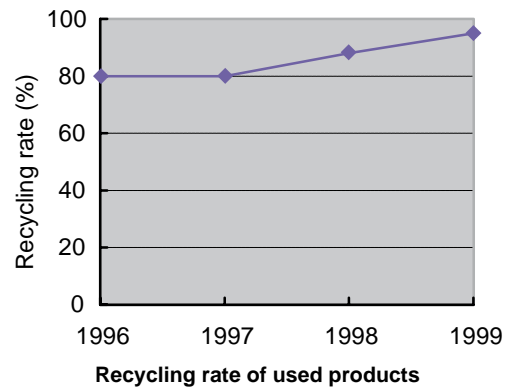
The recycling rate of used products in FY1999 was 95% (Oki sites in the Kanto region). The target was achieved before the targeted year.

2. Establishment of a Recycling Center

The Recycling Center was established at Oki Honjo area in July, 1999, to ensure that the processing of used products is performed in an appropriate manner and to improve the recycling rate of used products.

The Recycling Center receives used ATMs, PCs, printers, financial institution teller machines and other used products that are collected from customers. The products delivered, except for those which are reconditioned for reuse, are disassembled and processed according to their next use, such as reuse (parts and materials), recycle (reused as raw materials) and their disposal to landfills.

In consideration for the environment Oki gives the highest priority to the reuse of those products, parts and materials which cannot be reused are routed for recycling.



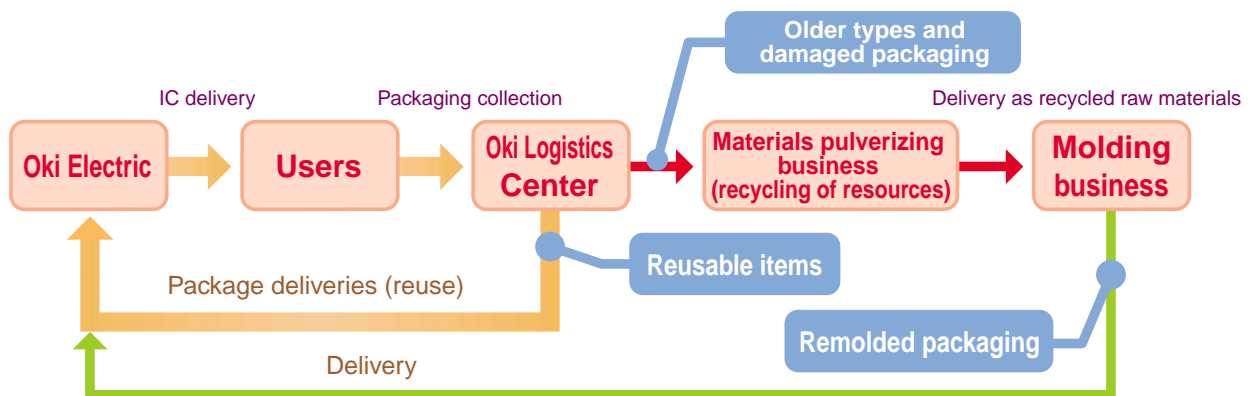
Recycling Center for used products

Recycling of Used Packaging and Packing Materials

Packaging for ICs (such as trays, magazines, tape reels) are being recycled.

IC packaging delivered with products to the users are later collected and reused after cleaning.

Since older types or damaged packaging cannot be reused, these are pulverized to be used as raw materials (recycling of resources) and remolded.



IC packaging recycling flow

Development of Eco-friendly Products

There are two types of eco-friendly products; (1) products which present a low level of environmental impact (such as energy conserving products), and (2) products which reduce the impact on the environment by peripheral and related products (such as equipment which reduces waste disposal). Oki is also developing the latter products, to contribute to the global environmental protection.

1. Development of Intelligent Transport Systems (ITS)

"ITS" is comprised of Vehicle Information and Communication System (VICS), Electronic Toll Collection (ETC) and Advanced Highway System (AHS). ITS is a new social system which integrates people, vehicles and roads by using leading-edge data communication technology. The improvement of environmental protection, safety and comfort are expected with this new system.

The test operations of the ETC systems started in April, 2000 and all major toll booths on the highways in Japan, are expected to be equipped with the systems by the year 2003. With the ETC systems in place, road congestion on highways will be reduced by 30%, which leads to a reduction in fuel consumption and CO₂ emissions. Oki is developing ITS, prepared for the start of practical operations in March 2001.



ETC testing site

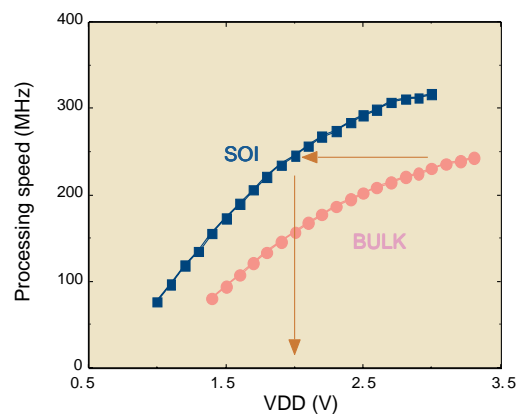
2. Development of energy conserving LSIs

LSI is used for electrical and electronic products as well as various other products, and is often referred to as the "rice of the industry" (the main ingredient of the industry).

A reduction of power consumption for LSIs, therefore, will have a great impact on the power consumption of electrical and electronic products.

Oki is merchandizing LSIs which operate with low levels of power consumption while maintaining an operating capability (processing speed) at the same level, by using the silicon on insulator (SOI) technology.

The graph to the right compares the voltage of existing LSIs (Bulk-type) and the LSIs produced by using the SOI technology, both with same processing speed. The ratio is 1:1.75, which indicates that the SOI-type LSIs operate with one third of BULK-type LSIs.



Processing speed and voltage of LSIs

Reduction of Industrial Waste and Reuse of Resources

Reductions in waste disposal and resource recycling are the foundations of the resources recycling society we would like to put into effect in the future.

Oki established a target, in FY1996, to "reduce the amount of industrial waste disposal by 30% of the total for 1995, by FY2000." This target was achieved in FY98 (54% reduction). For this reason, a review of the target was made in FY1999 and new activity targets were set as follows:

1. Reduce the amount of industrial waste disposal by 70% of the total for FY1997, by the end of FY2000.
2. Increase the resource recycling rate of industrial waste materials by 90% by the end of FY2000.

The final waste processing amount was 709 tons for FY1999, a reduction by 63% of the total for FY1997. The resource recycling rate, on the other hand, reached 90%, achieving the set target as well.

1. Industrial waste disposal reduction program

About 70% of industrial waste produced by Oki comes from semiconductor plants. In order to reduce industrial waste disposal, as well as increase resource recycling, activities are being conducted in the following manner:

- (1) Maintain a restraining control over the generation of waste disposal by reviewing and improving the production processes.
 - A reduction in waste disposal was achieved by processing waste ammonia fluid through a corporate internal waste process that transformed these fluids into harmless substances.
 - A reduction in waste disposal was achieved by flocculant reduction measures, used during the sludge treatment process.

For the above reasons, a reduction of 2,322 tons of waste disposal was achieved in FY1999.

- (2) Attempts to route waste materials generated for reuse and resource recycling.

Through the reuse of sludge for cement's raw materials and other endeavors, recycled resources increased by 545 tons in FY1999 when compared to the previous year.
- (3) All waste materials, that must be disposed of, are reduced in volume size in order to reduce the burden on the final waste processing plants.
 - Plastic waste disposal materials have been reduced in volume, prior to disposal, by using crusher units.
 - The amount of water extracted from sludge was increased to reduce the volume of sludge prior to disposal.

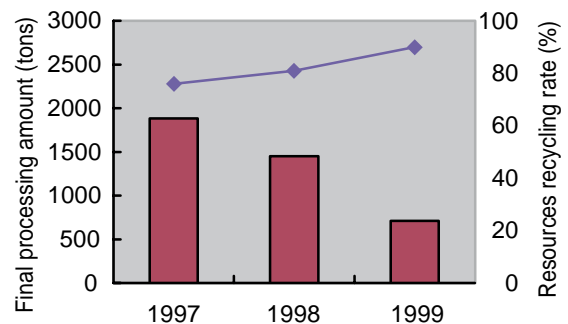
2. Reduction of office waste disposal

The leading waste disposal for offices is "paper waste." Used wood-free paper waste materials are already being routed for recycling, to create toilet paper and other paper products. At Oki Honjo area, for example, a policy which called for "recycling all paper that could possibly be recycled" was established in FY 1999, to expand the paper recycling activities. The important aspect of this activity is to "separate paper which can be recycled from those that cannot be recycled" in a reliable way. For this reason, the following action was carried out:

- (1) Special recycling paper collection boxes were created and placed in locations within the offices.

- (2) A Q & A collection which clarifies the various details concerning the recycling activity was published.
- (3) Actual conditions of the paper separation efforts were verified and problems were identified.

Through such activities it was possible to recycle 80 tons of paper waste per year, contributing to the protection of forests.



Industrial waste disposal and resource recycling rates



Awareness poster for the "waste paper collection"

Energy Conservation Program

Global warming which is caused by CO₂ emissions produced by burning fossil fuels, such as petroleum, is considered to be the most critical of all global environmental problems. In order to counter this problem, energy conservation, including electric power, has become a critical issue.

Oki has established targets for the reduction of CO₂ emissions generated by its own sites and is promoting activities to achieve these targets:

TARGETS

- Reduce the power consumption (energy consumption rate) by 10% more than 1995, by the year 2000.
- Reduce CO₂ emissions (energy consumption rate) from all energy consumption by 10% more than 1995, by the year 2000.

The electric power consumption (energy consumption rate) for FY1999 was 16.8% reduced over that of FY1995, thereby reaching their target.

Furthermore, the CO₂ emissions (energy consumption rate), were reduced by 15.9% over those of 1995 and 14.1% over the previous year, reaching their target as well.

1. Major energy conservation measures and effects for FY1999

Approximately 90% of all energy consumption at Oki takes place at its semiconductor plants.

In order to reduce the energy consumption the following measures were taken, centering around semiconductor plants.

Energy conservation measures	Effects (kiloliters of crude oil)
Improvement of production methods	1,390
Improvement of existing air conditioning and other facilities	325
Improved operating efficiency through centralization of facilities	118
Improved efficiency for lighting and the turning off of lighting when not needed	70
Change of fixed air conditioner temperature	56
Changes implemented at facilities (for increased efficiency)	20

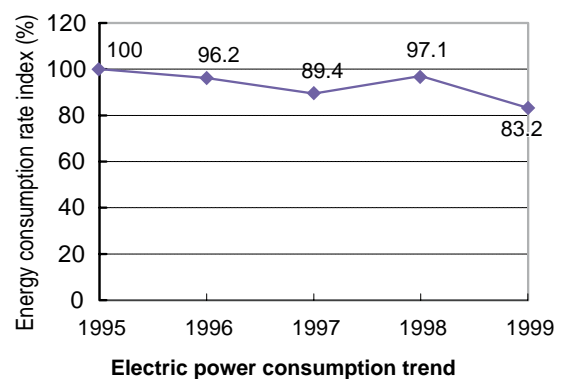
3. Energy conservation through improved production processes

In the printed circuit board production process, when production lines undergo changes to stop producing one type of product (say product A) to start producing another type of product (say product B), an idle time occurs due to the time required to change the production of product A to B. While such changes are being made the production facility is still in operation, causing a wasteful consumption of electric power.

In order to improve this situation Oki implemented the just in time (JIT)* production method at the Numazu Division, whereby the idle time is minimized and the wasteful facility operating time is reduced. This resulted in a reduction of approx. 20% of the power consumption.

*JIT production method

A production method which is characterized by the thorough elimination of waste, by various means including implementation of flexible production lines and reduction of lead time.

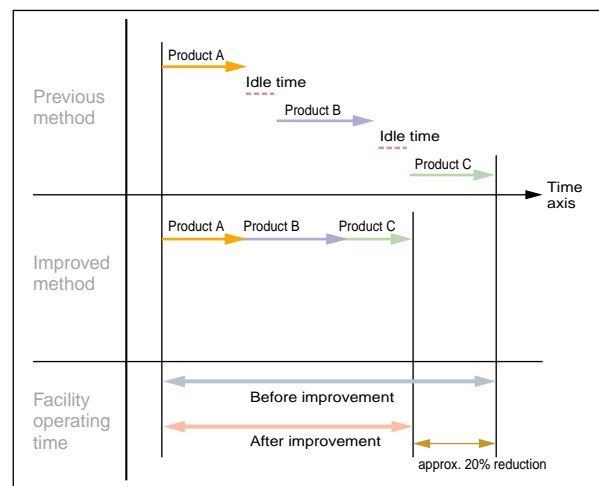


2. Carbon dioxide emissions reduced through increased boiler efficiency and fuel change

For a given desired thermal radiation level, gas supplied by local utilities produces 40% less CO₂ when compared to type A crude oil.

In FY1999, Oki Honjo area switched three of their four crude oil boilers to gas boilers, while at the same time the efficiency of the boilers was raised.

As a result, the CO₂ emissions reduced from 148 to 52 ton-C, and the sulfur oxide emissions were reduced from 542 to 35 Nm³.



Example of energy conservation through production process improvements

Management and Reduction of Chemical Substances

While chemical substances are essential for our daily life, without proper management, these can have grave effects on the environment. Oki is well aware of this fact and is striving to limit the use of chemical substances.

1. Chemical substance management

Chemical substances used for production as well as in products and those which seriously effect the environment, are classified as prohibited substances and voluntarily restricted substances.

Prohibited and voluntarily restricted chemical substances

Classification	Number of substance types	Management method	Examples
Prohibited substances	46	Substances which are prohibited for use	Trichloroethylene, tetrachloroethylene, 1,1,1-trichloroethane, Chlorofluorocarbon (CFC), halon, etc.
Voluntarily restricted substances	114	Substances that are monitored in terms of amounts used in production or contained in products, the use of which needs to be reduced.	Relevant laws and regulations controlling substances, industry voluntary restricted substances, carcinogens, etc.

2. PRTR (Pollutant Release and Transfer Registers) system related activities

PRTR systems provides a way to monitor the release of polluting substances into the environment. A law for the implementation of PRTR was enacted in July, 1999 and the first report prepared in accordance with this law is expected to be filed beginning April 2002.

Oki was implementing the PRTR system before the enactment of this law, and since 1997, the system has been in place for the reduction of toxic chemicals in accordance with the guidelines provided by the Electronic Industries Association of Japan.

In FY 1999 the amount of polluting substances used was reduced by 19%, while the amount of polluting substances released into the atmosphere, water and ground was reduced by 37% over the previous fiscal year.

FY1999 records of PRTR activities

(unit: tons)

Substance	Usage	Atmospheric release	Water release	Ground release	Consu	Reduced consumption	Waste transfer	Recycle
Xylene derivatives	52.93	3.94	0	0	0	0	8.56	40.43
Aluminum compounds	50.45	0	1.01	0	0	0	49.44	0
Lead solders	20.61	0	0	0	10.86	0	0	9.75
Monoethanolamine	20.10	9.28	0	0	0	0	0	10.82
PFC derivatives	12.06	2.55	0	0	0	9.29	0.22	0
Sulfur hexafluoride	4.70	1.19	0	0	0	2.50	1.02	0
Hydrogen chloride	3.78	0.19	0	0	0	3.58	0	0
Chlorine	3.34	0.18	0	0	0	1.12	2.04	0
Cellosolve acetate	2.88	0	0	0	0	0	0	2.88
HFC derivatives	2.65	0.93	0	0	0	1.61	0.11	0
Nickel compounds	2.51	0	0	0	0.42	0	0	2.09
Toluene	2.32	1.61	0	0	0	0	0.71	0
Hydrazine	1.20	0	0	0	0	1.20	0	0
Tungsten compounds	0.62	0	0	0	0	0.62	0	0
Fluorine compounds	0.34	0.02	0	0	0	0.32	0	0
Diphenylmethane	0.22	0	0	0	0.22	0	0	0
HCFC derivatives	0.15	0.03	0	0	0	0.12	0	0
Arsenic and arsenic compounds	0.01	0	0	0	0	0	0.01	0
Boron and boron compounds	0.01	0	0	0	0	0.01	0	0
Total	180.88	19.92	1.01	0	11.50	20.37	62.11	65.97
FY1998	223.14	26.96	6.51	0	12.51	23.49	56.02	97.68

3. Elimination of ozone depleting substances

While the Montreal Protocol calls for the regulation of ozone depleting substances, such as chlorofluorocarbon and 1,1,1-trichloroethane, Oki eliminated all specified particular chlorofluorocarbon and 1,1,1-trichloroethane used in the production processes, in 1993, before the year set for regulations by the Montreal Protocol.

Particularly specified chlorofluorocarbons, used in air conditioners, as well as particularly specified halon, used in fire extinguishers, will be eliminated in due course as facilities and equipment are replaced through upgrading.

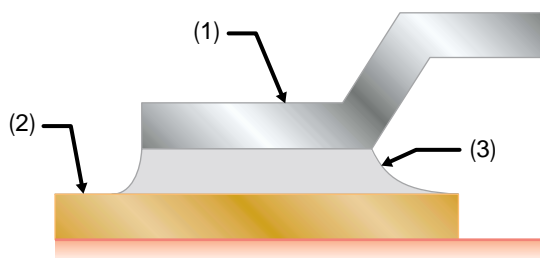
4. Elimination of lead solder

Solders which include lead, as a part of their composition, are used to connect ICs and printed circuit boards in common electronic products. When such products are disposed of, the solder may be dissolved by acid rain and this could be a threat with the discharge of lead, as lead is a toxic metal. In order to restrict such discharge, activities for a reduction in the amount of solder that is used with lead, as well as consideration for the use of a solder without the lead composition (lead-free solder), are being conducted in research and development, as well as in the production processes.

- **Program for totally eliminating the use of lead solder**

Lead solder is used for the connection of ICs to printed circuit boards, at three locations of (1) surface layer plating on the IC leads, (2) surface layer plating of the copper patterns on printed circuit boards and (3) solder for connections as shown in the diagram below. In order to totally eliminate the use of lead solder, alternatives must be implemented for these three locations.

Oki is considering the use of lead-free solder for locations (1) and (3). For location (2), elimination of the surface layer plating is being considered (with some products, this elimination has already been implemented).



- **Research of lead-free solder for connections**

Since the amount of solder used for the connection of IC leads and copper patterns, in the diagram

above (3), is large, the elimination of lead solder for such use is urgent. As a countermeasure for this problem, Oki is conducting research into the practical use of lead-free solder for such cases.

Through research, they have found that the mounting conditions, Sn-Ag-Cu lead-free solder with a high melting point, can be used under roughly the same conditions as existing mounting requirements.

Further research will be made for practical application of lead-free solders.



A printed circuit board with electronic components connected by lead-free solder

- **Program for reducing lead solder used in the production process**

The characteristics of cream solder, used in the soldering process of printed circuit boards, deteriorate in a short time and since those with deteriorated characteristics can not be used for production, they were disposed of.

As a measure to counter this problem, examinations were made on the implementation of cream solders with a slower characteristic deterioration rate and by switching the cream solders being used to slower deteriorating cream solders, the amount of solder used has been reduced.

In the Oki Honjo area the amount of lead solder used was reduced by 27% (448 kg) in FY1999, when compared to the previous year.

Pollution Prevention

In order to prevent pollution, such as atmospheric and water contamination, before it occurs, Oki is performing activities leading to the total elimination of all contaminating substances, periodical inspections and facility maintenance, as well as personnel training to deal with emergencies.

1. Atmospheric contamination prevention

Dioxin has been identified as a toxin which causes cancer and teratogenic substances which are harmful to man and animals. It is believed that this substance is produced mostly by waste disposal incinerators and is being regulated by the Air Pollution Control Law.

Oki group companies eliminated all waste disposal incinerators in 1999 in order to prevent the production of dioxin and other harmful substances.

The wastes produced are reduced in volume through the use of crusher units, and recyclable waste materials are being recycled.

2. Water table contamination prevention

One third of all city drinking water is tapped from the water table under the ground, and it has become clear, in recent years, that the organic chlorine solvents discharged from industrial plants are a problem causing water table contamination and this creates concern for the health of residents living near industrial plants.

Oki has eliminated all organic chlorine solvents used in production processes by prohibiting the use of 1,1,1-trichloroethane in 1993 and trichloroethylene and methylene chloride in 1997.

3. Noise and vibration prevention

In order to prevent noise and vibration emitted from the production plants that affect neighboring residents, control standards were established at each plant and inspections are being conducted periodically, with the taking of quantitative measurements.

In 1999, however, a complaint was filed by a neighboring resident concerning the noise emitted by one of the production plants.

The source of this complaint regarding the noise, was found to be a facility (cooling tower) within that production plant, so immediate measures (installation of an acoustic insulation board) and permanent adjustments (replacement of the facility) were performed.

Since this problem could not be prevented, a review of the emergency reporting organization as well as inspection methods was carried out, resulting in an improvement of the relevant standards.

4. Environmental risk management

Accidents involving the leaking of chemical substances, may occur due to natural disasters (acts of God), fire or malfunction of facilities, as well as human error in the

operation of facilities. In order to prevent such an incident from taking place the following measures have been implemented:

- (1) "Standard procedures for emergencies" have been established and personnel are trained according to these procedures.
- (2) Chemicals are stored in cases, such as those shown below. Cases are also stacked on top of the trays, thereby preventing chemical leaks, in the event a leak occurs for example, if these cases should happen to fall. The maximum height to which the cases may be stacked is also specified and this height is marked with a yellow line on the wall.
- (3) Liquid waste processing tanks are encased in concrete to prevent unforeseen leakage. The pipes leading to and leaving the tank are located above ground, so that they are accessible for visual inspections.



Chemical storage (Hachioji area)



Concrete encasing the liquid waste processing tank (Tomioka area)

Water Resources and Green Conservation

1. Conservation of water resources

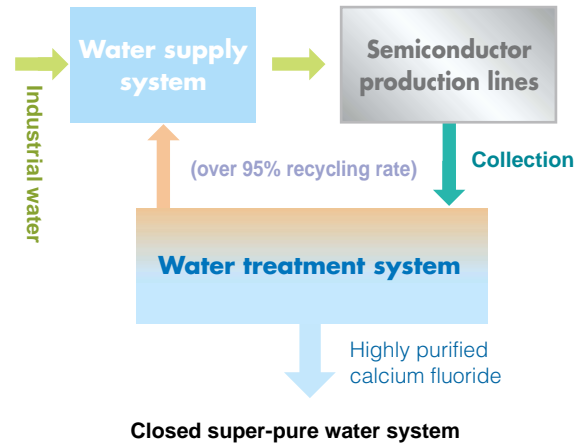
• Recycling water (semiconductor production plants)

A large quantity of water is required for semiconductor production processes. The semiconductor production plants are using a closed superpure water system and are recycling the water inside the plants. This system recycles over 95% of the water used, and as a byproduct, highly purified calcium fluoride (fluorite) for recycling is also being produced.

• Recycling of surface active agents

It is important to reduce the amount of substances causing deterioration of water quality, in order to conserve water resources.

Oki Engineering Co., Ltd., has developed a recycling system which utilizes a ceramic filter for the infiltration of the water whereby the surface active agents can be recycled. By using this system, it is now possible to recycle over 90% of surface active agents, which were previously disposed of.



Recycling system for surface active agents

2. Greening Conservation

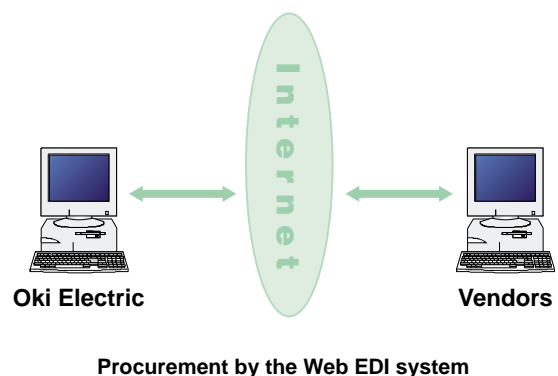
• Promotion of paperless operations by using electronic data interchange (EDI)

Paperless operations, through the digitization of management operations in drawings as well as digitization of accounting slips, are being promoted.

Oki previously issued purchase slips to procure parts and materials from vendors.

In order to reduce the amount of paper slips issued and as an additional measure to the existing EDI in operation via VAN, a "Web EDI system" was established to link the vendors with Oki via the Internet in FY1999.

Since the "Web EDI system" makes it possible to place orders from computers inside the company to the computers of the vendors through communication networks, paper purchase slips are no longer required for placing orders, resulting in a reduction of 1.2 million paper slips for the entire Oki Electric.



Establishment of Environmental Management System

Engaging in activities conforming to the ISO14001 standard is effective for reducing the impact on the environment from production activities and products.

For this reason, Oki has implemented an environmental management system, which complies with the ISO14001 standard, in various locations including other Oki group companies.

1. ISO14001 certification

Oki established a target, to have "all major production sites, including those of other Oki group companies, acquire ISO14001 certification by FY1998" and activities were promoted to achieve this target.

As a result, the sites listed in the table below have been certified, thereby meeting the initial target.

For the above reason, Oki Eco Plan 21, established in 1999, calls for a broader base to select sites and locations to be mandated for certification and activities are currently underway to meet this target.

ISO14001 certified sites

Company name	Certification
Miyazaki Oki Electric Co., Ltd.	February 1997
Oki Hachioji area	July, 1997
Oki Semiconductor Manufacturing Group	August 1997
Oki Takasaki area	November 1997
Oki Tomioka area	December 1997
Oki Honjo area	February 1998
Nagano Oki Electric Co., Ltd.	February 1998
Miyagi Oki Electric Co., Ltd.	March 1998
Oki Numazu area	March 1998
Oki Data Corp.	March 1998
Oki (UK) Ltd.	April 1998
Oki (Thailand) Co., Ltd.	July 1998
Tama Oki Electric Co., Ltd.	July 1998
Oki Printed Circuits Co., Ltd.	December 1998
Oki Shibaura and Makuhari area	March 1999

2. Training internal environment auditors

In order to evaluate and secure the reliability of the environmental management system, a periodic auditing is necessary.

In order to meet this need, Oki has been training internal environment auditors. 40 people completed this training in FY1999. This brought the total number to 259 people who completed the internal environment auditor training.

Of those internal environment auditors who meet criteria, such as experience and other requirements, 80 are certified as internal environment auditing leaders.

3. Acquiring and disseminating information concerning laws and regulations

It is crucial for the environment management system, that information of the establishment and amendments of laws and regulations be acquired in a timely manner and that such information is used to revise corporate internal rules and regulations accordingly. At Oki, this process is being carried out in the following manner:

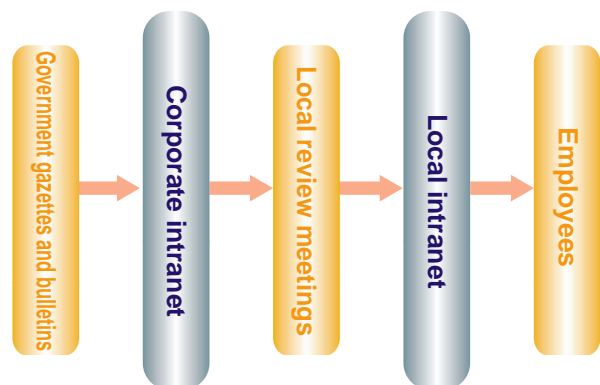
(1) The Global Environment Division checks all official government gazettes and bulletins and extracts information about laws and regulations relevant to environmental issues.

(2) The information is then disseminated to all Oki areas and group companies through their corporate intranet.

(3) The parties receiving such information then combine the information with all other information concerning local laws and ordinances acquired through individual effort and brings such information to the periodic review meetings.

(4) During such review meetings the information is reviewed to see if it applies to a particular area or location and if it does then it is used to revise the internal rules and regulations.

(5) The results of the above are announced to employees, through various means such as the local intranet.



Flow of information concerning government laws and regulations

Environmental Information Disclosure, Education and Motivation

It is important, for an environmental management system, that environmental information is disclosed in a positive manner, so that opinions and feedback can be collected from all people, both within and outside the corporation and we are able to continually improve the system. For this reason, environmental information is being disclosed in various ways.

1. Issue of 1999 Environmental Report

1999 Environmental Report was made available on the Oki web site, to introduce the way in which Oki is conducting environmental protection programs and activities, to the people both within and outside the company.

Both Japanese and English versions exist, and these describe the environmental policies of Oki, their program and activity plans and track records, as well as how the company is conducting environmental protection programs and activities.



1999 Environmental Report

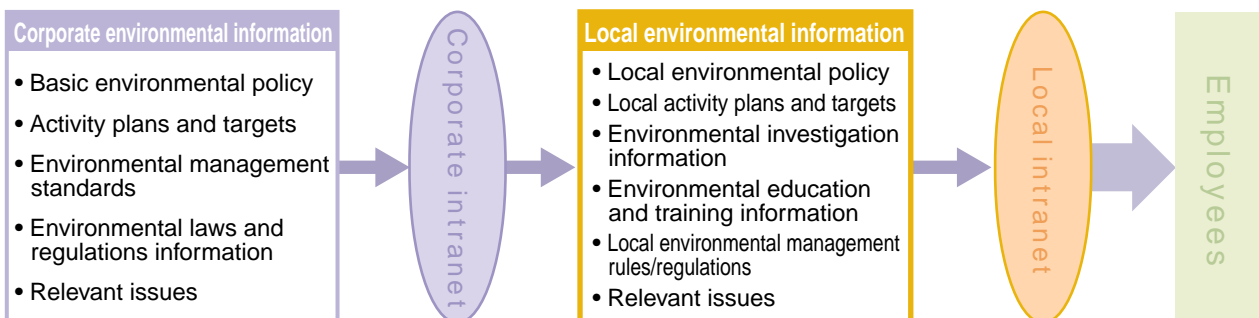
2. Environmental education

At Oki, there are corporate environmental education programs for their personnel and other group companies, as well as local education programs carried out by each individual site.

Program name	Applicable personnel
Corporate education	<ul style="list-style-type: none"> • General employees • Product designers and engineers
Local education	<ul style="list-style-type: none"> • General employees • New recruits • Transferees • Candidates to become internal environment auditors • Persons seeking related certifications • Persons involved in significantly related tasks

3. Information dissemination through the intranet

Intranet, established within the company, is used for the disclosure of information, education and motivation for environmental issues. Through this method information can be obtained from all offices and plants throughout Japan in a timely manner.



Corporate intranet



Local intranet

Environmental Accounting

In order to pursue activities and programs for environmental protection in an effective and efficient manner, Oki has been promoting activities to establish an environmental accounting system since FY1999.

A program was initiated in FY1999, to place the company in an implementation testing phase for environmental accounting. A system implemented at Oki Electric, as well as at three group companies that are responsible for producing a relatively large impact on the environment .

Fiscal year 1999 was also the year that newly established "Oki Eco Plan 21" was launched, involving the entire Oki group. The environmental protection cost for the year was JY280 million for facility investments and JY2.7 billion for expenses.

The environmental protection activities resulted in a 2.8% reduction of carbon dioxide emissions (a 2.0% reduction was targeted) compared to the previous year and a reduction in the final processing of waste materials of 54% (targeted for 30%) compared to the previous year, surpassing the previously set targets. The actual economic effect of all environmental protection measures totaled JY470 million.

1. Summary of past activities

Oki has been collecting data on energy consumption, waste disposal and other environmental impact-related information, to use for their environmental protection programs and activities. In order to respond to the Guidelines Concerning the Environmental Protection Cost Awareness and Information Disclosure, published by the Environment Agency in March 1999, a specialized committee was created with environmental protection and related accounting departments as the core members, to establish an environmental accounting system, so that the company can be fully aware of environmental protection costs and effects.

2. Purpose of implementing the environmental accounting system

- (1) To clearly understand the cost and effect of environmental protection activities, as well as the promotion of environmental improvement activities and effective environmental investments.
- (2) To promote the understanding of the company's stance for the environment by disclosing the environmental accounting information.

3. Fundamental approach for the FY1999 accounting

- (1) Establishment of the environmental accounting system, based on the existing environmental management system (ISO14001).
- (2) Compliance with the guidelines published by the Environment Agency (FY1999 issue) for environmental costs.
- (3) Understand the effects based on both the environmental protection effects (amount of improvements made to the environmental impact) and the economic effects.
- (4) R&D costs are mainly limited to those activities relative to the eco-friendly products and the environmental impact reduction for production processes.

4. Scope of accounting

Oki Electric and three Oki group companies (Miyazaki Oki Electric Co., Ltd. , Miyagi Oki Electric Co., Ltd. , and Oki Data Corp.)

5. Fundamental approach for the future

- (1) The scope of the environmental accounting will be expanded sequentially to include other Oki group companies, including those overseas.
- (2) Revisions will be made in accordance with Guidelines for the Implementation of the Environmental Accounting System (FY2000 issue) published in May 2000, by the Environment Agency.

Fiscal 1999 Environmental Accounting Records

Accounting period: April 1, 1999 through March 31, 2000.

(1) Environmental protection cost totals

(unit: JY million)

Classification	Details of main programs and activities	Total cost
Cost for reducing the direct impact to the environment	Management and maintenance of environmental activities related facilities, depreciations, etc.	2,160
Cost for management related to environmental activities	Environmental management system operation costs, etc.	350
Recycling costs for used products	Collection and recycling costs of used products	70
Research and development	Product and production process for environmental impact reduction R&D costs	30
Costs of affiliated companies' environmental activities	Environmental improvement programs/activities (e.g. greening and local community contribution activities, environmental reporting)	90
TOTAL		2,700

(2) Environmental protection effects

Environmental impact index	Details of main activities	Impact (total)	Reduction
CO ₂ emissions (t-C)	Reduction of energy consumption	71,509	2,072
Final waste processing (t)	Reduction of waste disposal, etc.	968	1,156

(3) Actual cost effect of the environmental protection measures

(unit: JY million)

Environmental impact index	Details of main activities	Effect amount
Cost reduction effects	Reduction of electrical power, crude oil and gas usage, as well as waste disposal costs and resource costs due to recycling	440
Direct income effect	Sales of useful assets	30
TOTAL		470

• Conditions of accounting

- (1) The depreciation costs of invested facilities are calculated by using the straight-line method for a period of three years. The effects resulting from these facilities are calculated for the three years only.
- (2) The personnel expenses are calculated by prorating the personnel costs for the amount of time spent on the environmental protection activities.
- (3) Environmental protection effects are calculated by obtaining the amount of environmental impact that has reduced in the production operations.
- (4) A portion of the accounting includes figures related to affiliated companies which are located within the sites within the scope of the accounting, which are participating in the environmental impact management.

Social Contribution Activities

1. Nature preservation activities

• Employees participate as volunteers in the "Fujisan no mori" (forests of Mt. Fuji) regeneration activities

Typhoon No. 17 which hit the national forests and privately owned woods in the environs of Mt. Fuji in 1996, caused unprecedented devastation, covering a large area (750 ha). Restoration and regeneration of damaged areas, for both national forests and privately owned woods, are urgent agendas.

The first "Fujisan no mori" regeneration activity, aimed at the reforestation, tree thinning as well as observation of nature, was performed by the Regeneration Activities Promotion Association (Secretariat: The Green Earth Center) in 1997, in cooperation with the Tokyo District Forest Office (Kanto Regional Forest Office, Forestry Agency, Ministry of Agriculture, Forestry and Fisheries) and Managing Office of Agriculture, Forestry and Fisheries Planning (Department of Agriculture, Forestry and Fisheries, Prefectural government of Shizuoka). Oki employees, including those from Oki Numazu and Tokyo areas as core members, have been participating as volunteers in a



Reforestation scene

series of activities since the very beginning. There have been a total of nine such occasions up to FY1999 and reforestation and tree thinning were conducted for a total of approx. 6 ha.

• Cooperation for the Nikko Cedars Roads (Japanese cedar colonnade in Nikko area) conservation activities

Devastation to the trees of the Nikko Cedars Roads, the special historic site and special national monument, has been serious, especially in recent years. Approximately 100 trees die annually and they need to be removed every year.

The Nikko Cedar Roads Protection Fund is involved in the promotion of "Nikko Cedar Roads Ownership Program," which derives its income from selling the ownership of the cedar trees to the public, and using the funds acquired through such sales to care for the rehabilitation of the cedar trees (treating the trees by peeling off the bark of the cedar trees when they are struck by lightning, applying disinfectant or growth stimulants, as well as providing soil to cover up the exposed roots).

Oki concurs with this movement and has become an owner of two such cedar trees from July 1997 and continues to remain the proud owner of the trees to this day.

2. Social contribution activities

• Environmental protection activities in tune with the region

Oki Takasaki area is sponsoring a series of discussion sessions concerning environmental problems in collaboration with other companies located in the same area.

Every year, a main agenda is established and discussions are held to consider how the members of the area should participate in solving problems or conduct activities relative to the main agenda. For fiscal 1999, the main agenda was "Environmental accounting." Other than the main agenda the sessions



A final waste processing facility visited by the study tour

also included other related activities, such as study tours of final waste processing facilities, electrical power plants as well as environmental facilities. All these activities were summarized and reported at the end of the FY.

• Community clean-up activity

Periodical clean-up activities of roads and other areas surrounding the plants are being carried out.



Clean-up activities of areas surrounding the plant (Oki Tomioka)

External Awards

The following awards were received in recognition of Oki group companies' environmental protection programs and activities.

Awards and citations in connection with the environment

Date	Recipient	Award and citation name (sponsor)	Reasons for receiving the award/citation
Oct. 1998	Miyagi Oki Electric Co., Ltd.	President's Award, The 17th National Plant Greening Promotion Assembly (Japan Greenery Research and Development Center)	Plant arrangement with consideration for protecting the natural environment, maintenance and management of seasonal trees.
Feb. 1999	Miyazaki Oki Electric Co., Ltd.	Director's Award, Superior Energy Management Factory category, Kyushu Bureau of Ministry of International Trade and Industry	Remarkable results in rationalization of plant energy usage
Feb. 1999	Miyagi Oki Electric Co., Ltd.	Director General's Award, Superior Energy Management Factory category, Agency of Natural Resources and Energy	Remarkable results in rationalization of plant energy usage
Oct. 1999	Oki Honjo area	Certificate of Appreciation for their Greening efforts (City Government of Honjo City)	Contributions to the creation of "Honjo, city of green and health."
Oct. 1999	Oki Hachioji area	President's Award, High Pressure Gas Safety Institute of Japan	Evaluated for the proper adherence to the laws and regulations, status of education and training of employees, daily operation conditions and the no accidents record.
Feb. 2000	Oki Hachioji area	Highest Award, Kanto Region Electricity Usage Rationalization Committee	Outstanding records in electrical power usage rationalization activities.
Feb. 2000	Nagano Oki Electric Co., Ltd.	Director's Award, Superior Energy Management Factory category, Chubu Bureau of Ministry of International Trade and Industry	Remarkable results in rationalization of plant energy usage

High-pressure gas operation safety training (Oki Hachioji area)



Oki Group Companies Environmental Protection Activities

Oki Electric and the Oki group companies are collaborating in environmental protection programs and activities.

All major production sites of the Oki group companies were ISO14001 certified by FY 1998.



Specified particular chlorofluorocarbon has been eliminated and energy conservation made possible through the implementation of a highly efficient refrigeration unit (Miyazaki Oki Electric Co., Ltd.).

The Director's Award in the Superior Energy Management Factory category from Chubu Bureau of Ministry of International Trade and Industry was awarded for the rationalization of the plant's energy usage (Nagano Oki Electric Co., Ltd.).



Properly organized industrial waste storage depot (Miyagi Oki Electric Co., Ltd.).

Energy conservation made possible through the implementation of the compressor control unit, which reduced the operation time (Fukushima plant, Oki Data Corp.).



Double layering of the roof of the plant improved the thermal insulation that reduced the energy used for cooling and heating (Fukushima plant, Oki Data Corp.).



Notebooks are created with paper used for printer and facsimile tests. 10,000 of these notebooks have already been donated to Thailand (Oki (Thailand) Co., Ltd.).

The processing unit which condenses the cutting waste in the wafer cutting waste water, produces clean water (Tama Oki Electric Co., Ltd.).



A measuring system used to control reduction of waste disposal (Oki Printed Circuits Co., Ltd.).

OKI

◆ For inquiries ◆

Global Environment Division

1-7-12 Toranomom, Minato-ku,
Tokyo 105-8460 Japan

FAX: +81-3-3508-1963

E-mail: oki-ecology@dm1.oii.oki.co.jp