Specific Global Environmental Issues and Our Response

1. Paper Resource Management

http://www.ntt.co.jp/kankyo/e/2000report/3/311.html

Protection of forests is an agenda of special priority where environmental issues—including biosphere preservation, prevention of global warming, and control of air pollution causing acid rain—are concerned. NTT Group is making a significant effort to minimize consumption of paper resources, making an effective contribution to protecting our valuable forests.

Use of Recycled Paper for Telephone Directories

■ Reduction of virgin pulp consumption

NTT Group issues some 120 million telephone directories a year, consuming approximately 140,000 tons of paper. (Fig. 3.1-1 and Photo 3.1-1)

Although this extensive circulation indicates the need for telephone directories, the resulting massive consumption of paper underlines the importance of our mission to develop and implement sustainable operations with the protection of forests in mind. Reduction of virgin pulp consumption in particular is of primary concern. To achieve these goals, NTT Group is making a concentrated effort to minimize paper consumption by reducing the total number of telephone directories in circulation as well as promoting the use of recycled paper.

To optimize the circulation of telephone directories, the NTT Group is working to inquire and estimate how many customers will need their directories to be renewed. Publication of telephone directories in CD-ROM format is also being pursued. (Photo 3.1-2: Trial publication of CD-ROM corporate telephone directory for the 23 wards of Tokyo.)

The use of recycled paper is being implemented through various measures, resulting in the publication of our Eco-Challenge Telephone Directory[1], featuring a higher ratio of recycled paper.

Through these efforts, consumption of virgin pulp in fiscal 1999 was successfully reduced to 73,000 tons, far below our initial target. (Fig. 3.1-2)

[1]Eco-Challenge Telephone Directory:
The "Eco" prefix symbolizes our dedication to environmental protection.

Fig. 3.1-3
This logo mark identifies our Eco-Challenge Telephone Directory

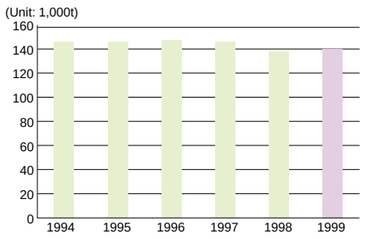


Fig. 3.1-1 Paper consumed in production of telephone directories

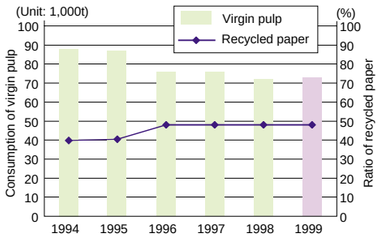


Fig. 3.1-2 Virgin pulp and recycled paper in production of telephone directories

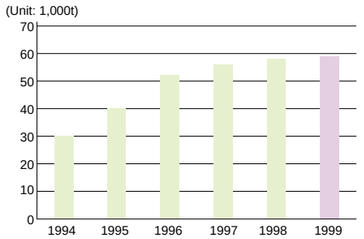


Fig. 3.1-4 Collection of used telephone directories

Photo 3.1-1 Telephone directories

Photo 3.1-2 Telephone directory in CD-ROM format

■ Saving paper via the Internet

In addition to providing customers with traditional printed telephone directories, the NTT Group also provides a variety of services utilizing electronic media.

Services include our "i" Town Page, an Internet version of Town Page, and Angel Line, an on-line service for Hello Page. These services were developed to expedite telephone number searches as well as to reduce the amount of paper consumed. (Fig. 3.1-5)

Angel Line is a service in which customers with PCs equipped with communications functions can directly access NTT's Telephone Number Information Center, enabling them to look up the telephone numbers they need for themselves. (Fig. 3.1-6)

Fig. 3.1-6 "Angel Line" home page, NTT West Japan
http://www.ntt-west.co.jp/angel

"Angel Line" home page, NTT East Japan
http://www.ntt-east.co.jp/angel

Fig. 3.1-5 "i" Town Page home page
http://english.itp.ne.jp/

■ Recycling old telephone directories

The NTT Group collects old telephone directories (Fig. 3.1-4) and recycles them as materials for products such as cardboard boxes, internal company publications, invoices and envelopes.

In February 2000, we replaced yellow paper with yellow ink on white paper to facilitate the recycling of our Town Page directories. This is an important step in our plan to introduce closed loop recycling[1] for telephone directories by the year 2001. (Fig. 3.1-7)

This closed loop recycling system aims to utilize old telephone directories, rather than old newspaper, as the recycled paper component in the production of telephone directories. The success of this innovative recycling system depends on the efficient collection of old telephone directories.

With this goal in mind, the NTT Group is striving to collect as many old telephone directories as possible. For customers who are not at home at the time of collection, a toll-free phone number is printed on the back of the directory, enabling them to contact us for free-of-charge collection at their convenience.

We will continue our focus on collection of used telephone directories and implementation of closed loop recycling as part of our ongoing efforts to maximize paper resources.

[1]Closed loop recycling:
A recycling system in which a certain product is recycled in the production of its replacement in an effort to minimize the waste of natural resources.

■ Green procurement

The closed loop recycling system, in which new telephone directories are produced using old ones, is a sign of the demands of our times. In order to implement such programs without adversely affecting humans and the surrounding environment, it is essential to choose materials which do not contain harmful chemical substances when procuring raw materials.

The NTT Group recognizes our responsibility to provide customers with telephone directories they can use with confidence, and constantly aims to practice green procurement, with harm-free materials a top priority.

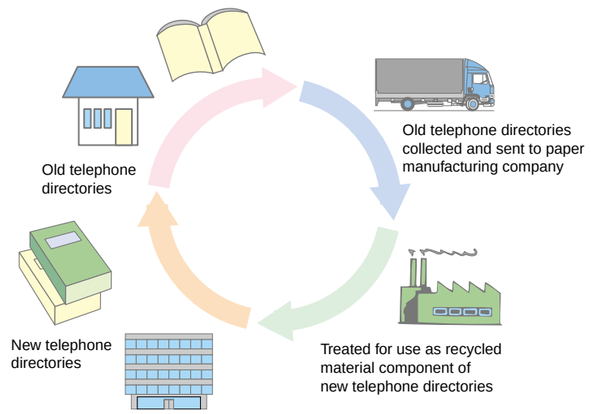


Fig. 3.1-7 Closed loop recycling of telephone directories

2. Preventing Global Warming

http://www.ntt.co.jp/kankyo/e/2000report/3/321.html

With the steady progress of global warming, it is feared that rising sea levels could affect the biosphere in the not-so-distant future. As part of our wide-ranging efforts to prevent global warming, the NTT Group is involved in projects to reduce emissions of greenhouse gases, such as carbon dioxide, generated by our business activities.

The NTT Group TPR Initiative

The amount of electricity consumed by the NTT Group is expected to increase due to the proliferation of the Internet, mobile phones, and other advances as society becomes increasingly reliant on information sharing technology.

Beginning in October 1987, the NTT Group has made continuous efforts to reduce electricity consumption. In October 1997, as an extension of these efforts, we launched our Total Power Revolution (TPR) initiative, detailing our commitments to cope with power-related issues from the earliest stages of R&D.

In February 1998, we announced our Vision for the Reduction of Electricity Requirements toward 2010 to ensure the success of the TPR initiative and to fulfill our responsibility to respond to environmental issues. (Fig. 3.2-1)

■ Three pillars of the TPR initiative

The TPR initiative targets three major areas:

- Energy reduction through R&D
- Energy reduction at departments using communications facilities
- Energy reduction at departments that maintain and manage power-generating equipment

In fiscal 1999, the NTT Group purchased approximately 5.4 billion kWh of electricity, which translates into CO_2 emissions of approximately 2.06 million tons.

CO_2 emissions in fiscal 1999 were originally expected to increase by about 18% year-on-year. By virtue, however, of the TPR initiative, the increase was contained at about 11%. This means an effective reduction of approximately 130,000 tons of CO_2. (Fig. 3.2-2)

With our TPR initiative as the base, the NTT Group will continue to provide solutions to energy issues in the communications field through active involvement in energy-related R&D. At the same time, we aim to reduce energy costs in addition to working to suppress CO_2 emissions—the primary cause of global warming—thus contributing to building the infrastructure for the information sharing society and preserving the global environment.

- ◆ Step 1: To develop energy-efficient components and parts, such as LSIs
- ◆ Step 2: To efficiently introduce communications equipment that incorporates achievements from Step 1.
- ◆ To improve the self-sufficiency ratio of electricity from 4% (estimated) in 2000 to 30% in 2010.

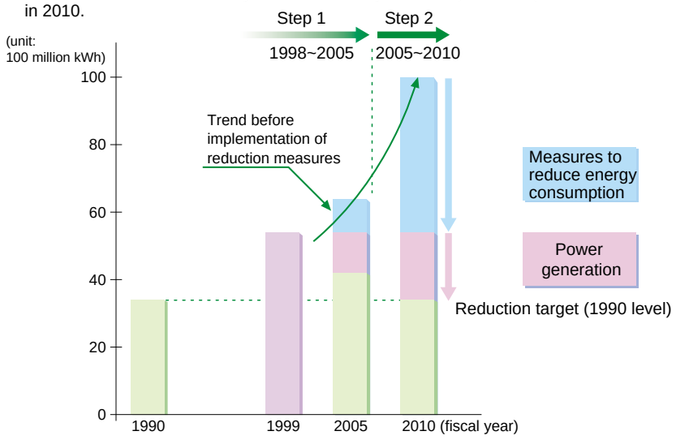


Fig. 3.2-1 Vision for the reduction of electricity requirements toward 2010

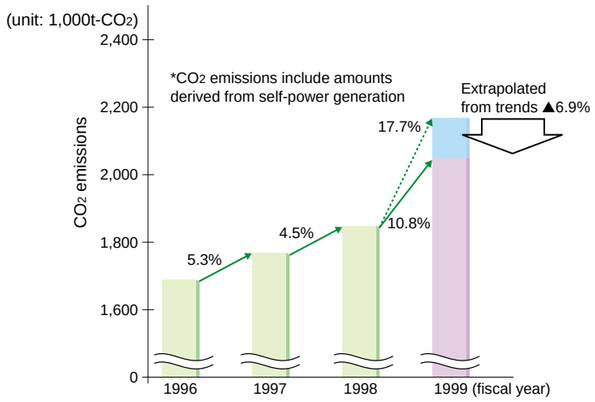


Fig. 3.2-2 CO_2 emissions produced in connection with NTT Group electricity consumption and power generation

Clean Energy Facilities

■ Introduction of solar and wind power generation systems

In March 1996, the NTT Group introduced a 555 kW photovoltaic power generation system—the largest roof-top installation of its kind in the world—at the present East Japan Training Center in Chofu City, Tokyo. By March 2000, we had installed 50 photovoltaic power generation systems (approximately 1.3 MW) and 4 wind power generation systems (approximately 0.2 MW) in various areas of Japan. These facilities supply approximately 2 million kWh of electricity annually, which translates into a reduction of some 740 tons of CO_2 emissions.

■ Introduction of hybrid and stand-alone power systems

In March 1998, we introduced a hybrid system which combines 230kW wind power generation and 20kW photovoltaic power generation at the NTT Kume-jima Radio Relay Station in Okinawa. This facility utilizes technology to regulate fluctuations in voltage and frequency of electricity generated by wind power, and represents a new level of harmony with natural energy sources.

We have also been introducing stand-alone photovoltaic power generation systems, the first of which went into operation in December 1999 at the Chihokutoge Wireless Station of NTT DoCoMo Hokkaido. In designing the system, we analyzed historical meteorological data and verified reliability of supply using simulations, overcoming the inherent instability of natural energy resources and creating a highly reliable power generation system.

Musashino R&D Center—Built to Conserve Energy

Opened in November 1999, the NTT Musashino R&D Center was designed to conserve energy and reduce environmental impact in line with our Green Building Design Guidelines. After thoroughly analyzing specific requirements and conditions for operation as a R&D center for the NTT Group, the building incorporates a number of the latest technologies.

Photo 3.2-1 NTT Musashino R&D Center

■ Design plan

- The building is positioned laterally, east to west, reducing the surface area to minimize heat load from the sun.
- In view of year-round energy consumption from cooling facilities, research rooms with energy-consuming computers and servers are located on the north side of the building.

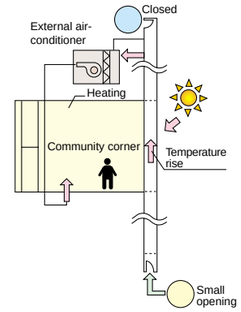
■ Structural components and functions

Double-glazing

Double-glazing, adopted for the windows in the community corner on the south side of the building, is an energy-conservation system that effectively utilizes natural energy. While maximizing the transparency and light penetration of glass, this system serves to alleviate strong sunlight in the summer, insulate in winter, and provide natural ventilation in other seasons. (Fig. 3.2-3).

Solar power louvers: 36 kW

Louvers to transform solar light into clean electric energy are installed on the south side of the building. Serving the dual function of building materials as well as power generators, these highly efficient louvers are equipped with vents for temperature control. (Fig. 3.2-4)



Example: In the winter mode, vents at the bottom of the double-glazing are opened, transforming the internal space into a heat collector that delivers warm air to the air-conditioner. Insulation effect also reduces heat load.

Fig. 3.2-3 Functions and effects of double-glazing

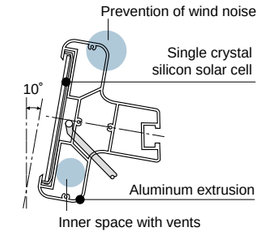


Fig. 3.2-4 Structure of photovoltaic power generating louver

■ Building facilities

CGS (Co-Generation System): 750 kW x 2 units

This system generates electricity from clean city gas. Hot water and steam generated during power generation are utilized for air-conditioning, heating and hot water supply. At the main building of Musashino R&D Center, one third of the electricity is provided by co-generation, resulting in a reduction in costs and in CO_2 emissions, one of the primary causes of global warming.

Fuel cell system: 200 kW

The building is equipped with a multi-type fuel cell system which operates with either city gas or LPG. Total energy efficiency of 80% has been achieved with a combination of newly developed single- and double-layer absorption refrigeration machines. The advantages of this system include clean emissions, low noise, and minimal vibration.

Minimizing CO_2 Emissions from Company Vehicles

As of the end of fiscal 1999 the NTT Group owned approximately 44,000 vehicles, which together emit approximately 88,000 tons of CO_2.

As part of our ongoing efforts to reduce CO_2 emissions, we are introducing low-pollution vehicles, promoting an anti-idling campaign (nicknamed 'TAKO Zero'—keep the tachometer at zero) for all company vehicles, and seeking to reduce the total number of vehicles in our fleet.

Based on CO_2 emission targets set forth in the action plan established in 1991, we have been working to stabilize vehicle CO_2 emissions at 1990 levels in and after 2000. Subsequently, we will continue to gather and analyze data in an attempt to achieve even further reductions in CO_2 emissions.

We also plan to introduce a greater number of low-pollution vehicles in line with cost considerations and technological developments in the field.

New Shipping Network System

NTT Logisco, the logistics arm of the NTT Group, does not own any delivery vehicles. In addition to the need to control delivery costs, increasingly varied consumer needs and requirements for sophisticated logistic services, including more frequent, small-lot deliveries, make the reduction of environmental impact an important concern. In April 2000 we initiated a New Shipping Network System with the aim of improving truck loading efficiency. Replacing the conventional route-based shipping system, the new system is based on zones in which all goods for delivery within a predetermined area can be delivered by a joint delivery system. (Fig. 3. 2-5)

This New Shipping Network System permits the optimal dispatch of vehicles, based on day-to-day fluctuations in volume and destinations. The new system contributes to lessening the environmental impact of our logistics operations through the combination of more efficient joint delivery and a reduction in the overall number of trucks.

Photo 3.2-2 Low-pollution vehicles and "TAKO Zero" anti-idling campaign mark

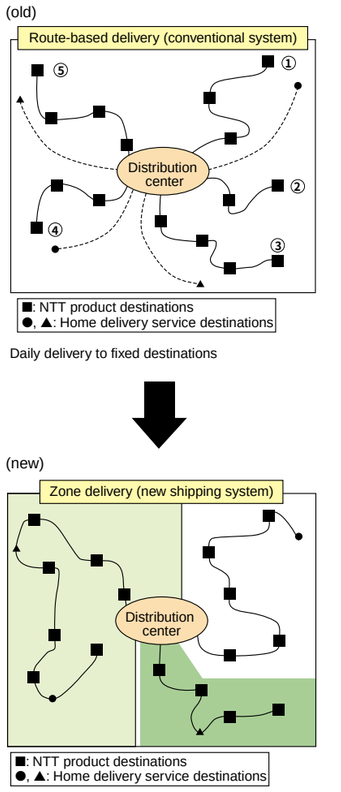


Fig. 3.2-5 Schematics of old and new shipping systems

3. Waste Management and Proper Disposal

http://www.ntt.co.jp/kankyo/e/2000report/3/331.html

Effective waste management efforts result in the reduction of loads at processing facilities, which in turn leads to reductions in harmful emissions, global warming and slower depletion of limited resources. At the NTT Group, we make active efforts to reduce the volume of waste generated in the course of our activities and to ensure efficient and proper disposal of the waste products generated.

Disposal of Dismantled Communications Facilities

The NTT Group utilizes a wide range of facilities and equipment, including communications cables and switchboards. In 1999, communications facilities removed for renewal totaled approximately 250,000 tons. (Fig. 3.3-1) The environmental impact of such a large volume of waste is significant, and we make every effort to actively promote not only appropriate disposal, but also reduction of waste volume, reuse and recycling.

■ Promoting proper disposal and developing Internet database of disposal results

In 1997, manifests were introduced to track and manage disposal of removed communications facilities. In conjunction with the introduction of manifests, we also initiated a new system to monitor the progress of each shipment and accumulate data on disposal results via our internet networks. This system enables us to monitor the waste disposal process from start to finish, while the database has the potential to serve as an important tool for reducing wastes and promoting recycling. (Fig. 3.3-2)

■ Reducing waste volume and promoting recycling

The NTT Group currently recycles copper used in cables, reuses concrete telephone poles for roadbed materials and reclaims discarded batteries for reuse.

In procuring communications facilities, we prioritize green procurement by endeavoring to purchase materials and components with a high percentage of recyclable materials and items that generate lower environmental impact when disposed as waste.

■ Introduction of electronic manifest system

NTT East introduced an electronic manifest system in the Metropolitan area in July 2000. The electronic manifest is managed by the Japan Industrial Waste Technology Center, as stipulated in Article 12, Section 4 of the Law concerning Waste Disposal and Cleaning and as designated by the Minister of Health and Welfare. The main advantages of the electronic manifest system include:

- Paper manifests required storage and management for five years. The electronic manifest is centrally managed at information processing centers, streamlining and increasing the efficiency of paperwork.
- Automatic notice is given when collection, transportation or disposal of industrial wastes becomes overdue.
- Each year, information processing centers compile reports to local governments containing manifest information which must be submitted by waste-generating enterprises

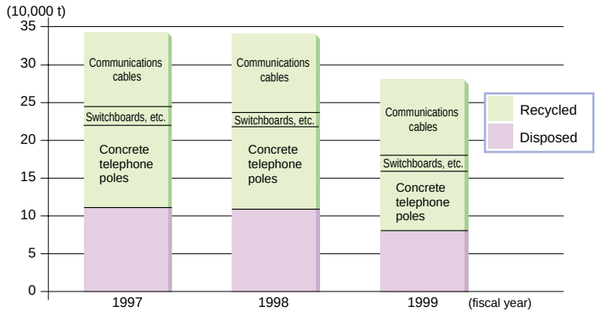


Fig. 3.3-1 Discharge, recycling and disposal of removed communications facilities

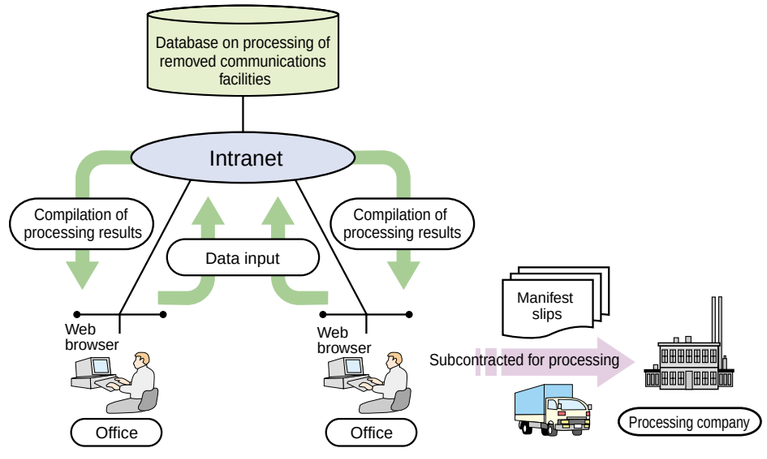


Fig. 3.3-2 Intranet system for managing waste processing data

4. Promoting Recycling

http://www.ntt.co.jp/kankyo/e/2000report/3/341.html

Recycling is the primary focus of our efforts to protect the global environment. At the NTT Group, we consider development of more effective recycling systems one of our most important tasks, and aim for total recycling of communications facilities, office supplies, and even kitchen trash from our cafeterias.

Promoting Reuse of Dismantled Telecommunications Facilities

The NTT Group actively promotes the 3Rs for removed communications facilities and other industrial waste:

- Reduction (of waste volume)
- Reuse
- Recycling

■ Promoting reuse and recycling

Information on reusable items such as communications cables, telephone poles, and public telephones is registered on our internal LAN to encourage reuse at appropriate locations.

We also promote collection and recycling of copper, iron, and precious metals used in cables and other equipment, recycling of concrete telephone poles for roadbed material, and reclamation of used batteries.

■ Recycling plastics

Plastics present a major dilemma for recycling due to problems related to market development, grading and separation, and cost effectiveness. At NTT, we are committed to improving the efficiency of plastic recycling, and are making steady progress, a step at a time.

Fig. 3.4-1 illustrates our approach to plastics recycling.

Connection terminal boxes[1] (made of polypropylene) and support line guards (made of polyethylene) are examples of material recycling (NTT-closed system). (Fig. 3.4-2)

Support line guards (Photo 3.4-1) formerly displayed a sticker indicating recycle status, but the marking has now been integrated into the material during the molding process (Photo 3.4-2), eliminating the need to remove the stickers and achieving 100% recycling of the material.

These and other plastic recycling efforts generated 530 tons of repellets[2] in 1999. (Fig. 3.4-3)

Removal and replacement of optical fiber cables is expected to increase, and we are currently implementing thermal recycling, using them as raw materials for cement production.

[1]Connection terminal boxes:
Housings that cover connections between cables and also between cables and subscribers' service lines.

[2]Repellets (recycled pellets)
Plastic waste transformed into uniform granules for recycling

[3]Spiral sleeves
Wrappings that protect cables

[4]External line clasps
Fixtures to fasten external lines leading to subscribers' homes

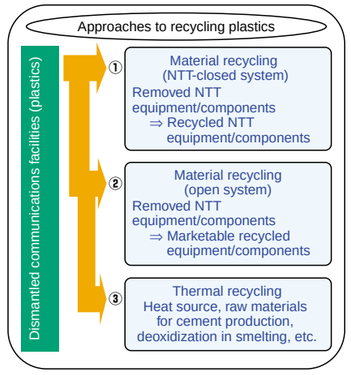


Fig. 3.4-1 Priority of plastics recycling methods

Photo 3.4-1 Support line guards

■ Promoting recycling through green procurement

We will continue to strengthen our recycling efforts by implementing our Green Procurement Guidelines (see page 20), standardizing and clearly indicating the materials used in our equipment, selecting easy-to-recycle materials, minimizing harmful substances, and purchasing items with easy-to-recycle and easy-to-dismantle designs.

Dismantled equipment/components	Recycled items
Connection terminal boxes	① Connection terminal boxes ② Telephone pole indication panels ③ Spiral sleeves[3]
Support line guards	④ Support line guards
Black bakelite telephones	⑤ External line clasps[4]

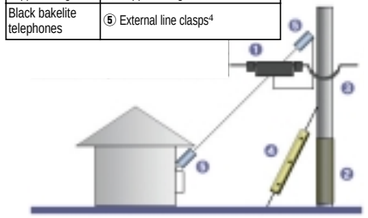


Fig. 3.4-2 Example of plastic materials recycling

Photo 3.4-2 Improved recycle status marking

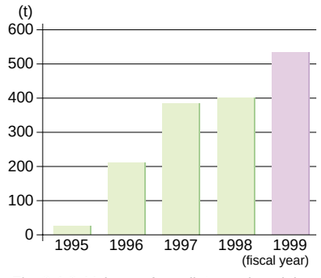


Fig. 3.4-3 Volume of repellets produced through material recycling

Recycling of Cellular Phones, PHS Units and Batteries

The NTT DoCoMo Group is also actively engaged in the collection and recycling of used products in order to reuse them effectively as resources.

Used products collected by DoCoMo shops, such as DoCoMo battery packs, battery chargers, cellular phones, and car phone units, are separated at recycling factories to be incinerated or crushed. Metal content of batteries is separated and melted into nickel, cobalt or cadmium ingots. Precious metals such as gold and silver from cellular phone boards are extracted and recycled. Recovered nickel ingot is used for stainless steel while cobalt is reused for magnets in speakers and motors.

Table 3.4-1
Collection of used cellular phones, batteries, etc. by NTT DoCoMo Group

Items	Fiscal 1999
Cellular phones and PHS units	approx. 5.9 million units
Batteries	approx. 4.9 million units
Chargers and accessories	approx. 1.4 million units

Photo 3.4-3 DoCoMo Come Back poster

Improvements in Product Packing and Packaging Materials

In 1990, approximately 257 tons of polystyrene was used annually as protective packing for communications equipment sold by the NTT Group. While polystyrene has excellent characteristics as a packing material, protecting products from shock, moisture and humidity, it has a negative impact on the environment as it does not decompose easily under natural conditions.

In accordance with increasing awareness of global environmental issues, we have been gradually switching from polystyrene to cardboard, a renewable resource. We now use cardboard for packing new models of cordless phones and facsimile machines for home use.

For heavier items, such as facsimile machines for office use, internal switchboard equipment, and other precision instruments for which there is no suitable substitute, we are reducing volume by using thinner layers of polystyrene packing. (Fig. 3.4-4)

In 1996, we achieved our initial target figure of 70 tons of annual consumption (roughly one quarter of 1990 levels). In 1999, we reduced the volume to some 29 tons, less than half of the 1996 level. (Fig. 3.4-5) For cordless phones and fax machines for home use we have completed a 100% switch to cardboard packing material.

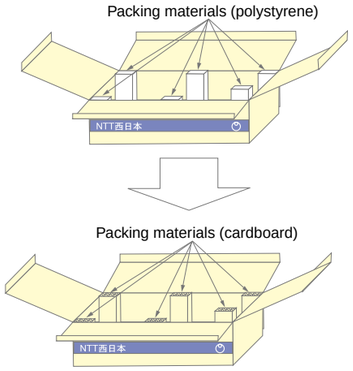


Fig. 3.4-4 Use of packing materials (example: NTT West)

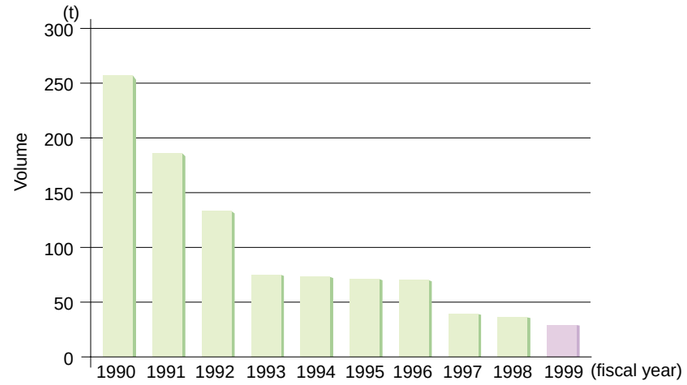


Fig. 3.4-5 Volume of polystyrene used as packing material for communications equipment

4. Promoting Recycling

Zero Kitchen Garbage

The NTT Group has initiated a Zero Kitchen Garbage campaign, an effort to recycle kitchen garbage generated at approximately 600 employee canteens nationwide.

In April 1999, we introduced garbage fermentation equipment to recycle kitchen garbage at canteens mainly in the Metropolitan area. An example of a Zero Kitchen Garbage zero emission[1] recycling loop utilizing high-speed garbage fermentation processors is outlined below. (Fig. 3.4-6)

① Garbage is biologically decomposed using aerobic bacteria[2] with no sawdust, chips, ceramics, etc.

② Compost generated through decomposition is transported to fertilizer facilities and mixed with other organic components, such as oil cake, fish meal and bone powder. This process transforms the compost into a convenient organic fertilizer.

③ This organic fertilizer is used to cultivate agricultural products such as vegetables, which in turn become foodstuff on our tables.

In this way the recycling loop is completed, achieving our Zero Kitchen Garbage goal.

[1] Zero emission:
A recycling system which generates no wastes
[2] Aerobic bacteria:
Bacteria which thrive in air with oxygen.

Website for details of high-speed kitchen garbage fermentation processor:
http://www.ntt-me.co.jp/bio/

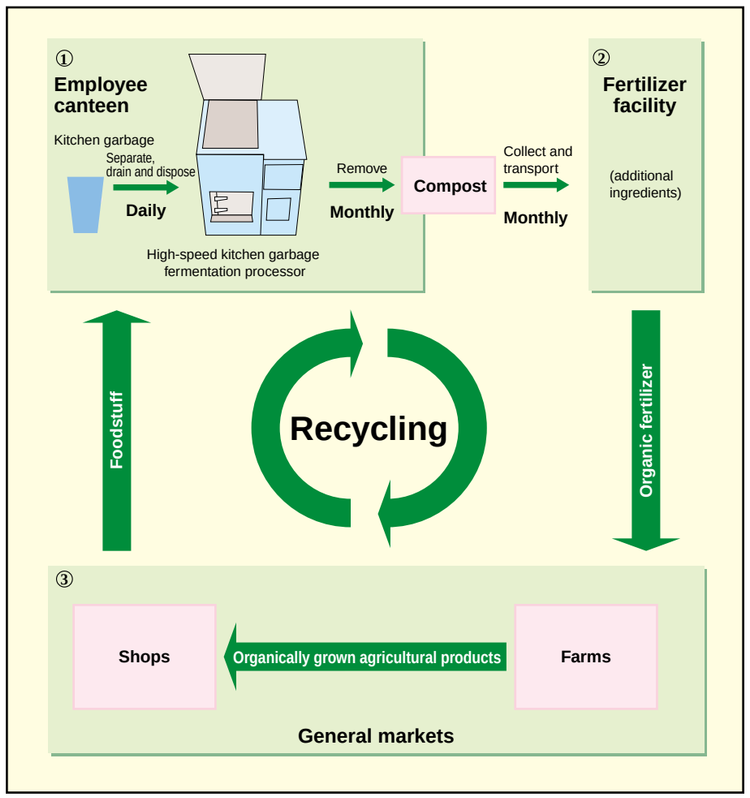


Fig. 3.4-6 Zero Kitchen Garbage recycling system

Recycling Box for Confidential Documents

At NTT Logisco, we have developed a recycling system for confidential documents to encourage effective management of paper resources and minimize the use of paper shredders.

NTT Group departments in charge of customer services generate a large amount of paper-based customer data, consuming an enormous amount of time, labor and electricity as well as generating a huge volume of waste. The recycling box offers a solution to this problem.

Since trial introduction in 1994, we have made significant improvements to the system, resulting in full-scale implementation in 1997. As of 1999, some 2,000 boxes have been installed, collecting approximately 3,000 tons of paper per annum.

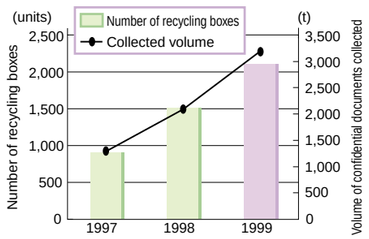


Fig. 3.4-7 Number of recycling boxes and volume of confidential documents collected

Photo 3.4-4 Recycling box

Website for details of recycling boxes
http://www.ntt-logisco.co.jp/integ/index06.htm

5. Protecting the Ozone Layer

http://www.ntt.co.jp/kankyo/e/2000report/3/351.html

The ozone layer is an important natural barrier that blocks harmful ultraviolet rays, protecting all living creatures on Earth. The NTT Group is making all-out efforts to reduce our use of CFCs which cause deterioration of the ozone layer, so that people can live without fear of harmful UV radiation.

[1] CFCs (Chloro Fluoro Carbons)
Chemically stable, nonflammable and non-toxic substances composed of fluorine, carbon and chlorine. With these traits, CFCs are widely used as coolants in turbo freezers, foaming agents for insulators, and cleaning agents for electronic parts. Due to their chlorine content, CFCs have a high ozone-depleting factor.

[2] Heated steam reaction method
A method to destroy CFCs by decomposing them with steam heated to approximately 650°C. After CFCs are hydrolyzed, they are neutralized and cooled with calcium hydroxide solution. This method offers the advantages of a high decomposition rate (more than 99.99%) and the ability to treat large volumes of CFCs.

Replacement of Turbo Freezers and Maintenance of Internal CFC Banks

■ Number of turbo freezers removed/remaining

In 1992, the Fourth Conference of the Parties to the Montreal Protocol set forth a schedule for elimination of specified CFCs[1]. Following this, in Nov. 1992, the former NTT Group Global Environmental Protection Promotion Committee determined a basic policy for the Group to cease installation of new turbo freezers using specified CFCs, with a schedule to replace the majority of existing turbo freezers by the year 2000. As of the end of fiscal 1992, 166 turbo freezers required replacing. In fiscal 1999, 10 freezers were replaced, leaving a total of 8 freezers in operation. This replacement ratio of 95% indicates that the program is progressing on schedule. (Fig.3.5-1)

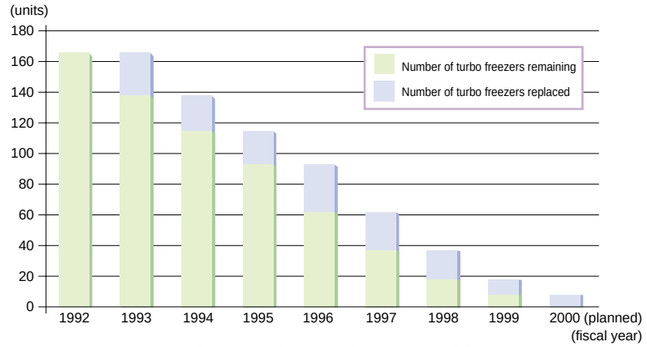


Fig.3.5-1 Turbo freezer replacement schedule

■ Internal CFC banks

Since July 1994, the NTT Group has maintained internal CFC banks for effective management of specified CFCs. Replacement of turbo freezers is progressing on schedule, and destruction of specified CFCs is being contemplated for fiscal 2000. We currently maintain CFC banks at five locations, where approximately 46 tons of specified CFCs are stored under proper control. After careful consideration of cost, time, and documented results, we have selected the heated steam reaction method[2] and combustion method of decomposition as outlined in CFC Decomposition Guidelines prepared by the Air Quality Preservation Bureau of the Environment Agency. (Photo 3.5-1)

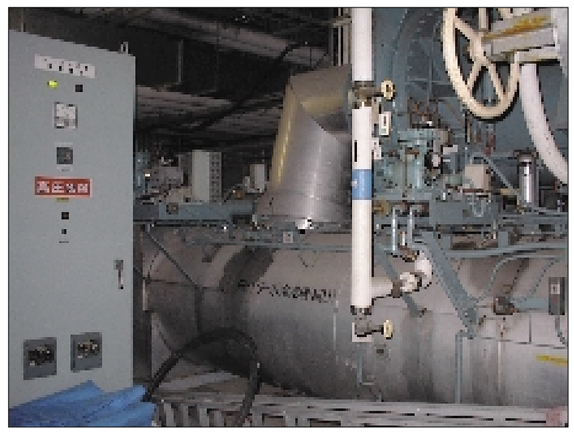


Photo 3.5-1 Turbo freezer

6. Minimizing Environmental Risks

http://www.ntt.co.jp/kankyo/e/2000report/3/361.html

As a leader in the field of information sharing services, the NTT Group has a responsibility to research, analyze, and actively develop measures to minimize environmental risks.

Effects of Radio Waves upon Humans

The proliferation of radio transmissions, as characterized by mobile phones, has led to mounting concerns about the effects of radio waves upon humans. When considering such effects, we need to separate physiological effects from the effect of electromagnetic interference upon electronic medical equipment such as pacemakers.

■ Compliance with global directives

Research on how radio waves affect human health is being carried out worldwide. In cooperation with the World Health Organization (WHO), the International Commission on Non-Ionized Radiation Protection (ICNIRP) has assessed research results and presented basic restriction values as safety guidelines for using radio waves. These values are far below those which are presumed to affect humans. Based upon various countries' recommendations including ICNIRP guidelines, the Telecommunications Technology Council (an advisory organization to the Ministry of Posts and Telecommunications) has submitted reports outlining guidelines for protecting humans when using radio waves in Japan since 1990.

At NTT DoCoMo, in addition to implementing R&D on methods to precisely estimate the strength of radio waves relating to this issue, we make it our policy to utilize radio waves strictly in compliance with these guidelines. Radio base stations are constructed and operated with due consideration of possible effects on the surrounding environment. Mobile phones are designed so that electromagnetic power absorbed by human users is well below the guide values regarding SAR (Specific Absorption Rate).

■ Surveys and R&D

In response to requests from medical equipment manufacturers and medical institutions, NTT DoCoMo has made active efforts to ensure that our mobile phones do not adversely affect medical equipment such as pacemakers.

With regard to possible interference with other medical equipment, we are conducting surveys and experiments in cooperation with related organizations, and contributing to developing new medical equipment, which is able to withstand radio interference. As part of these efforts, we have conducted research to develop testing equipment (Photo 3.6-1) and measurement methods to accurately assess the effect of radio waves, and analyzed the characteristics of all types of pacemakers available in Japan.

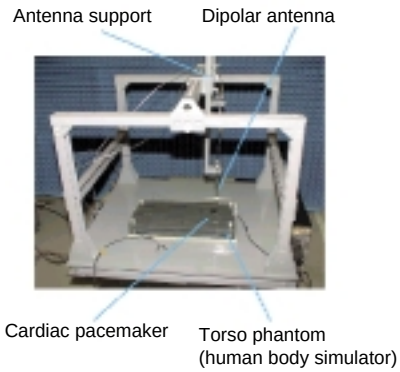


Photo 3.6-1 Testing equipment

EMC (Electro-magnetic Compatibility)

Telecommunications units can affect the electro-magnetic environment by emitting electro-magnetic waves and interference, while they in turn also can be affected by such interference. This phenomenon is predicted to become more prevalent as telecommunications technology continues to proliferate. (Fig. 3.6-1) Thus, our focus on electro-magnetic compatibility (EMC) technology. EMC technology controls noise emissions from telecommunications units, prevents deterioration of quality due to incoming interference, and improves immunity to malfunctions caused by such interference.

Since joining the VCCI[1] in 1989, the NTT Group has taken various active positions, such as establishment of internal standards, in order to maintain an electro-magnetic environment conducive to efficient communications. At the same time, it will soon become necessary to widen the application of the EMC regulations in response to ever-advancing communications technologies.

At NTT (the holding company), staff are dispatched to international and domestic standardization organizations, contributing actively to drawing up or recommending standards. Furthermore, we are promoting R&D to respond to new types of communications, including investigation into the mechanism of breakdown occurrence, development of technology and parts for communications systems design, assessment of electro-magnetic environments, and development of technology to control and manage the electro-magnetic environment.

[1]VCCI (Voluntary Control Council for Information Technology Equipment):
A world organization involved in developing standards to govern interference generated by electronic devices

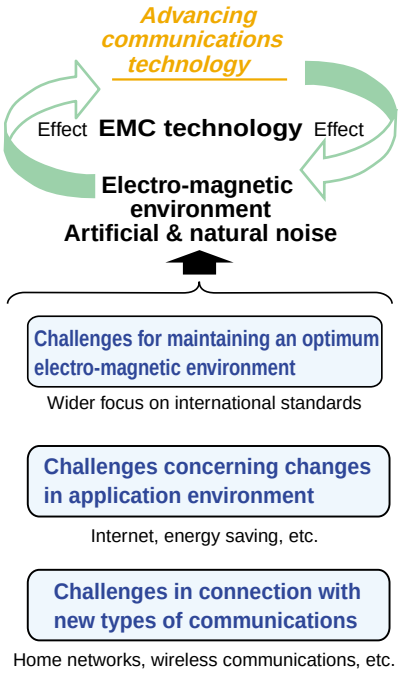


Fig. 3.6-1 EMC-related activities