



Our Environmental Protection Activities

As for our corporate activities we understand that we impact the environment in many ways. Thus we seek to raise our awareness level of the degree to our impact on the environment and minimize unnecessary loads. In this section, we look at how we should work with the environment and our business practices as well as what we have done so far to make our business environmentally responsible.

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Environmental Management Systems

<http://www.ntt.co.jp/kankyo/e/2001report/2/211.html>

The NTT Group is working to establish an environmental management system in accordance with ISO14001*. This project is based on our belief that in order to prevent pollution and to reduce negative impacts on the environment it is essential for each of our group affiliates and their local branch offices to put forward as much effort as possible. The NTT Group is providing active support through consulting services so that each office can establish and apply our environmental management systems. We also utilize environmental audits to continuously improve our systems.

How Do We Implement Environmental Protection?

Companies in the NTT Group share the basic concepts of the NTT Group Ecology Program 21. With this common ground, we are working to establish the system to implement our environmental protection activities. (Fig. 1)

PDCA for Promotion of NTT Group Environmental Protection Activities

What's PDCA? It's a keyword to promote the NTT Group's Environmental Protection Activities. To make sure it gets concrete results, the NTT Group has established an action management system that will overview the activities

of the group as a whole. (Fig. 2)

PLAN

Based on the NTT Group's corporate mission and its Global Environmental Charter, the NTT Group Global Environmental Protection Promotion Committee established the following four criteria; "Basic environmental policies," "Mid-to-long term plans," "Annual plans," and "Targets."

Based on these guidelines, each group company must develop detailed division-specific programs for implementing environmental protection activities.

DO

Each Group company promotes action plans for implementing environmental protection activities.

CHECK

Implementation status is self-checked, and further assessed by the Environmental Protection Promotion Organization of each NTT Group company. And each Group company or NTT Group Global Environmental Protection Promotion Committee will check compliance with the regulations.

ACTION

The results will be reflected by the improvement of environmental policies, annual plans,

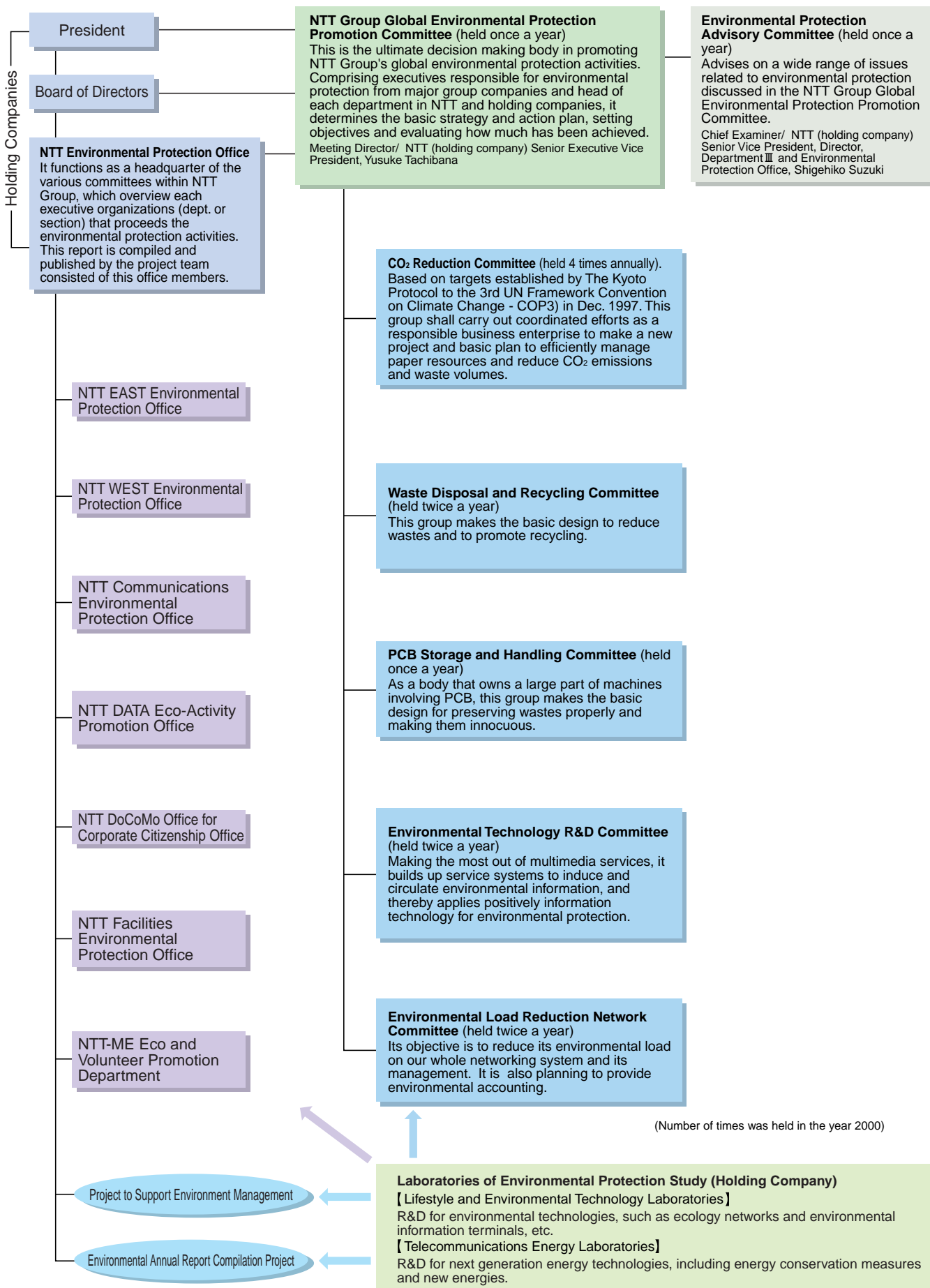
*ISO14001
International standard for environmental management system.

Fig.2 PDCA for promotion of NTT Group environmental protection activities





Fig.1 NTT Group organization for promoting environmental protection



mid-to-long term plans, and action goals for the year to come.

Environmental Consulting

In July 2000, NTT Group launched the "Project to Support Environmental Management". The aim is to implement the NTT Group's Ecology Program 21 and to support environmental protection activities, providing consulting services for all environment-related matters.

In the fiscal year 2000, we worked on supporting environmental consulting audits and the self-monitoring of eight group companies, providing skill-up opportunity for EMS staff.

Self-Monitoring and Environmental Audits

According to the "NTT Group Global Environmental Charter", we will establish and maintain an environmental management system. In order to establish the environmental management system and to handle it properly, self-monitoring is essential. For better auditing within the organization, we have broken down the whole auditing process into three levels. (Fig. 3)

LEVEL 1 is initial environmental auditing, which ensures proper compliance with laws and regulations. The NTT Group has complied with all laws and regulations on environmental

protection, including local ordinances and reference values specified by various agreements. The Group also regularly reports to local governments as to its regulatory implementation.

LEVEL 2 is environmental management system audits in compliance with ISO14001.

LEVEL 3 is the most sophisticated environment audit which applies LCA* or environmental accounting.

Self-Monitoring

Since 1995, all business offices within the NTT Group have conducted self-monitoring at least once a year to ensure proper compliance with laws and regulations (including ordinances, agreed-upon reference values, and internal regulations and standards). NTT EAST, NTT WEST and NTT Communications, for example, conducted their auditing by using environmental check-lists covering all legal matters, on-site inspections, document inspections, and hearings. The results are reported to the NTT departments in charge of environmental protection.

Environmental Audits

Based on the self-monitoring results, every three to four years the environmental management system is checked to see if its activities are productive and legal, and if its rules are followed.

For other group companies, they send and collect a questionnaire to maintain the regulatory implementation. For a sample of the environmental check-list, please see Fig. 4.

***LCA**
Abbreviation of Life Cycle Assessment. A method of environmental assessment for a product that considers the entire process from acquisition of materials to disposal of waste. If the cost is included, LCC (Life Cycle Cost) will be used.

Fig.3 Level of Environmental Audits

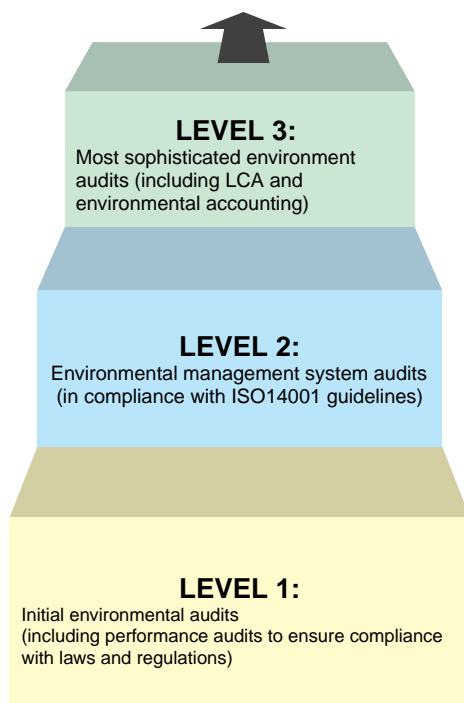


Fig.4 Sample Environmental Check-list

Category	Main Title (sample)
Environmental management	Environmental Protection Action Structure
Paper Resource Saving Policy	Office Paper Management Measure
Measures for prevention of global warming	Measures for compliance with revised energy conservation laws, implementation of daily energy conservation activities, power-receiving systems, telecommunication power sources, air conditioning, lighting, gas, oil, boilers, small boilers, oil tanks, low pollution vehicles
Waste management	Office waste, obsolete communication facilities, medical wastes, PCBs (stored and currently used), others (bridge asbestos, construction asbestos, etc.)
Protection of ozone layer	Turbo freezers, halon fire extinguishers
General issues	Water, septic tanks, office supply procurement



Environmental Risk Management

We always face a risk that our facilities, equipment or materials which contribute to our corporate activities may possibly have an adverse influence on the environment. Therefore, it is essential to conduct risk management to ensure that the possibility of adverse affects is kept to zero. Thanks to these efforts, no penalties or fines regarding the environment were imposed on the Group in 2000.

Abiding by Environmental Laws and Regulations

The NTT Group, which mainly conducts information services, is regulated by various environmental laws such as Waste Disposal and Public Cleaning Law*, Law Concerning the Rational Use of Energy*, and others shown below.

Waste Disposal and Public Cleaning Law

The NTT Group disposes industrial waste only with certified specialists and tracks the waste through the entire disposal process with the use of "manifest*." We also control storage of industrial waste under strict guidelines. Some of our group companies have stricter rules on this issue, tracking the waste through the entire disposal process by GPS and inspecting the disposal process regularly.

Law Concerning the Rational Use of Energy*

Our 138 facilities with large-scale telecommunication equipment and host-computers consume more than 6 million kWh annually. We manage these facilities with extreme caution, recording all the energy consumption and making every effort to reduce consumption.

Air Pollution Control Law*, Water Pollution Control Law*, Sewerage Law

We have 156 facilities regulated by our air pollution control law. Most of them are boiler facilities that produce electricity or heat, and they emit smoke in the air. We keep our emissions under the quality standard designed by the air pollution control law. We apply the same principle with the water pollution control law and sewer management law.

Law for Promotion of Sorted Collection and Recycling of Containers and Packaging*

This regulation is implemented among our Group companies such as NTT EAST, NTT WEST, NTT DoCoMo, NTT DATA. Under these law, we control the amount of our packaging materials.

Fire Service Act*

It is required that our oil tanks undergo regular inspection and other reports to authorities by fire and disaster management law.

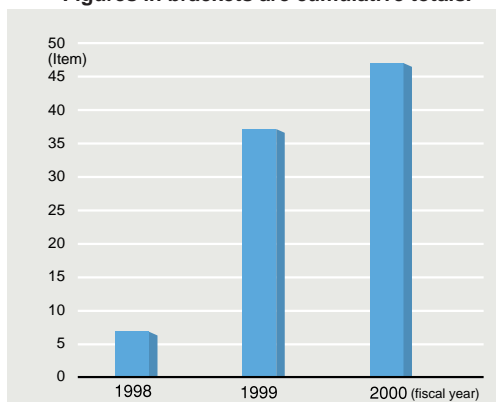
Prevention of Soil Contamination (Automatic Oil Leakage Detection System for Underground Tanks*)

The NTT Group has installed underground tanks for storing fuel for auxiliary generation in various pivotal locations throughout Japan. Automatic oil leakage detection system for these underground tanks has been introduced to prevent oil leakage from the tanks. This system constantly supervises the tanks and it ensures that accidents do not happen. These measures are further strengthened through the use of double-wall structures on all newly installed underground tanks.

Examples of ISO 14001 Certification

The NTT Group's first acquisition of ISO-14001 certification was that of the NTT Material Department in November 1997. Since then 47 organizations (as of March 2001) have acquired certification, such as 5 of NTT EAST, 10 of NTT WEST and 16 of NTT DoCoMo. (Fig. 5)

Fig.5 ISO14001 certifications within the NTT Group (as of March, 2001)
Figures in brackets are cumulative totals.



*Waste Disposal and Public Cleaning Law

It regulates how to dispose industrial wastes. This was enacted in 1970 and revised in 2000.

*Law Concerning the Rational Use of Energy

It defines basic policies regarding energy preservation. This was defined in 1980 and revised in 1998.

*Air Pollution Control Law

This 1968 law establishes emission standards for industrial soot and smoke as well as exhaust gases from motor vehicles, in order to protect public health.

*Water Pollution Control Law

This 1970 law regulates industrial waste liquids, promotes cleaner drainage from households, and establishes liability without negligence for those polluting water.

*Manifest

It is a card tracking disposal process for industrial waste. Such processes are required for all the industrial waste since December 1, 1998.

*Sewerage Law

It was enacted in 1958 in order to maintain a high standard of public water safety by promoting a well-maintained sewer system.

*Law for Promotion of Sorted Collection and.....

It promotes disposal by classifying package materials, and establishes liability for recycling.

*Fire Service Act

It was enacted in 1948 in order to minimize damages caused by fire and earthquakes.

*Automatic oil leakage detection system for underground tanks

It has been introduced in order to prevent oil leakage from underground tanks. This system constantly supervises the tanks, and ensures that accidents do not happen.

Environmental Accounting

<http://www.ntt.co.jp/kankyo/e/2001report/2/221.html>

Environmental accounting, for the NTT Group, is a plan to grasp and disclose the costs necessary for environmental preservation and their effects on our industry activities. The NTT Group hopes that environmental accounting will increase understanding of the information sharing industry even more and will continue its efforts step-by-step.

Purpose of Environmental Accounting

The NTT Group has implemented an environmental management system and disclosed the environmental performance of activities and the results of following its own environmental procedures and environmental goals.

Moreover, we are aiming at more transparent business operations by disclosing environmental accounting in environmental reports.

We hope to use environmental accounting effectively as an important index of judging if procedures, purposes and objectives relating to the environment have been achieved as well as a tool for the improvement of our environmental performance.

Introduction of Environmental Accounting

In 2000, for the first time, the NTT Group tried out environmental accounting to evaluate the costs of investments and expenses related to environmental preservation and their results as a link to the accountability which businesses should achieve.

Particularly, we evaluate the results of the decreased environmental burden on society as a whole by the information sharing services.

Environmental Accounting Methods and Results

As our main efforts, we can give examples such as risk management activities of costs of environmental protection for each NTT Group company, researching the social value of information sharing services and researching the effects of environmental preservation.

1. Scope of Totalization

NTT (holding company), NTT EAST, NTT WEST, NTT Communications, NTT DoCoMo Group (the NTT DoCoMo Group is NTT DoCoMo and eight regional DoCoMo companies: Hokkaido, Tohoku, Tokai, Hokuriku, Kansai, Chugoku, shikoku, and Kyushu.), NTT DATA

2. Period of Totalization

April 1, 2000 ~ March 31, 2001

3. Method of Totalization

(1) Totaled using "Developing an Environmental Accounting System (Year 2000 Report)" from the Office of the Environment (now, Ministry of the Environment) published in May 2000.

(2) Environmental cost is totaled after separating it into "facilities investment" and "expenses." Furthermore, personnel expenses are included in expenses, but depreciation was not.

(3) The amount of the economic effects were drawn from "Profits Gained from Recycling," "Reducing Monetary Expenses of Electricity by Curtailing Energy," and "Reducing Expenses through Reuse and Recycling," which are all easily understood. We have not totaled the unseen effects or effects of avoiding risk, for which the preconditions of independence within the company will become important.

(4) The cost of facilities investment and personnel expenses, where the entire amount could not be judged as an environmental cost, were calculated through difference totalization* or percentage totalization* (proportional totalization).

(5) Basic research and development is carried out by NTT (holding company), while applied research and development is carried out by the group companies.

(6) We have totaled the research and development related to the environment, such as low-energy devices, clean energy, recycling, and the promotion of the distribution of environmental information.

*Difference totalization

Totaling environmental preservation costs, when they compositely relate to costs of other purposes, after removing the costs outside of environmental preservation.

*Percentage totalization

Totaling only the percentage of the effects of environmental preservation within the effects of a certain cost.

4. Results of Totalization

(1) The environmental costs corresponding to "Guidelines for the Introduction of Environmental Accounting" from the Office of the Environment and the totaled results of economic effects are shown in Charts 1 and 2.

(2) The effects of environmental preservation are shown together with the specific efforts on the pages shown in Chart 2.

(3) The environmental cost total was ¥54.65 billion. (about ¥16.1 billion in investments and ¥38.55 billion in expenses)

(4) The economic effects were ¥25.72 billion.

The Future Direction of Environmental Accounting

In the future we would like to make environmental accounting even more complete in the following ways:

(1) Continued examination of calculation methods and improved accuracy for grasping costs and effects.

(2) Future efforts for calculation of unseen effects such as the effects of avoiding risk and the social environmental effects of information sharing services.

(3) Not just a value of profit and loss, but implementing better plans as effective tools for practicing environmental management, such as grasping the efficiency index. (for example, reduced environmental burden ÷ environmental preservation costs)

(4) Overlap the creation of unified guidelines for related companies and the examination of data gathering for more accurate "environmental accounting linked to the NTT Group".

(5) Ensuring accuracy comprehensiveness by incorporating the opinions of third parties.

Environmental accounting is an important way of thinking to show compliance with environmental indexes. Our company is creating plans to use even more useful tools for managing environmental accounting.

Chart 1 Fiscal year 2000 costs and effects of NTT Group environmental preservation

Item	Environmental preservation cost		Environmental preservation effect
	Environmental investment	Environmental expense	Material effect
(1) Total cost within business areas	95.0	196.5	◆ Amount of CO ₂ reduced: 110,000t-CO ₂
Pollution prevention costs	5.5	27.3	◆ Amount of old telephone books collected: 58,000t
Global environmental preservation costs	71.0	8.7	◆ Amount of dismantled telecommunication equipment reduced: 37,000t
Resource circulation costs	18.6	160.4	◆ Amount of used telecommunications devices and batteries collected: 19.92 millions of unit
(2) Fluctuation costs	0.0	24.8	
(3) Management activities costs	0.1	24.3	
(4) Research and development costs	44.5	131.9	
(5) Social activities costs	21.4	8.0	
(6) Costs corresponding to environmental damages	-	-	
Total	161.0	385.5	

Chart 2 Effects of environmental preservation

Item	Page	Economic effect
Amount gained from recycling	28 ~ 29	54.1
Reduced expenses by curtailing energy	26 ~ 27	15.8
Reduction of waste disposal expenses with recycling	28 ~ 30	0.1
The amount of reduced expenses of new purchases through reuse and recycling of dismantled telecommunications facilities	28 ~ 29	184.9
Other economic effects	-	2.3

Chart 3 Fiscal year 2000 NTT Group investments and research and development costs

Total amount of investments during the period	26,658.5
Total amount of research and development costs during the period	4,060.2

Note: The total amount of investments and research and development costs for the period is the total value from the interrelated NTT Group companies.

The Guidelines for Procurement, R&D, and Design

<http://www.ntt.co.jp/kankyo/e/2001report/2/231.html>

The NTT Group has established "Green Procurement Guidelines," "Green R&D Guidelines" and "Green Design Guideline for Buildings" to promote the development of environmentally aware business activities. (Fig. 1) These three sets of guidelines reflect three unique characteristics of the NTT Group.

The Guidelines

Characteristic #1: Does Not Have a Manufacturing Division

Because the NTT Group has no manufacturing divisions, it is necessary to purchase products from suppliers. We have therefore developed Green Procurement Guidelines from the efforts to procure environmentally friendly products, and they are being implemented by our procurement divisions.

Characteristic #2: Has a Research and Development Division

The R&D division is engaged in the research and development of services, systems and products, but it is necessary to plan newly developed products from the development stage to consider the environment. Our Green R&D Guidelines were established to conduct environmentally friendly research and development.

Characteristic #3: Owns a Huge Number of Buildings Nationwide

By incorporating environmentally friendly building design from the initial stage, it is possible to achieve a considerable reduction in environmental impact in later operational stages. From this viewpoint, we have established our Green Design Guideline for Buildings and are applying them to the construction of NTT Group buildings and facilities.

ment. (Fig. 2, Photo 1)

The NTT Group as a whole procures approximately 100,000 specific items, and we use approximately 250 businesses on a regular basis to provide basic supplies. These supplier and item assessments are based on our "corporate policy" and "product assessment."

As of March 2001, we have conducted corporate policy assessments of 40 companies. Product assessment was conducted on approximately 10 new procurement products, while assessments of spec sheets for approximately 20 existing products were conducted when their specifications were revised. We have also received approximately 60 cases for assessment to coincide with VA* proposals.

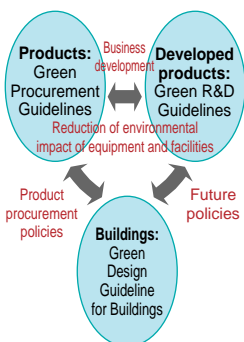
Green R&D Guidelines

In March 2000, the NTT Group adopted "Green R&D Guidelines" (Photo 2) for research and development of new services, systems and products. These guidelines are our response to the emergence of a "recycling-based society."

By following these guidelines from the initial stages of R&D, we aim to reduce harmful effects on the environment in ways such as controlling waste and promoting recycling.

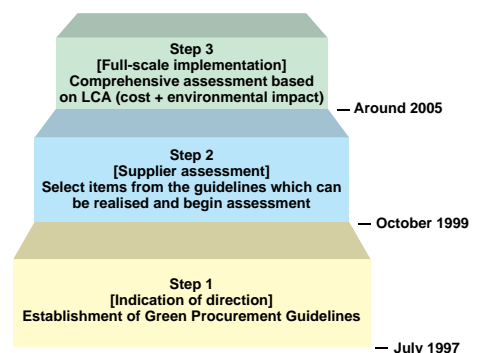
Furthermore, detailed guidelines will be drawn up beginning with Energy R&D Guidelines, then detailed guidelines for harmful substances, detailed guidelines for indication of material names and detailed guidelines

Fig.1 NTT Group environmental guidelines



*VA Value Analysis. Proposals for improvements from suppliers including price reductions, improved functions, etc., for material/components and articles which we purchase on a continuous basis.

Fig.2 Steps for implementation of Green Procurement Guidelines





for saving resources, with the process scheduled for completion by 2004.

For example, the Energy R&D Guidelines were established in March 2000 in view of such needs, with the aim of promoting reduced energy consumption and lessening the environmental impact of R&D throughout the NTT Group. (Fig. 3)

In order, however, to counter expected increases in energy consumption, it is essential to reduce the amount of energy consumed by newly developed communication facilities. Adoption of energy-saving measures from the initial stages of R&D is a vital portion of our environmental agenda.

Green Design Guideline for Buildings

The NTT Group owns approximately 30,000 buildings throughout Japan. Significant amounts of energy are consumed and waste generated in the process of construction, demolition, refurbishment and repair of these buildings.

The Green Design Guideline for Buildings established by NTT in 1997 and revised in 2000, outlines our concepts for environmentally sound building design and summarize items to be considered in developing those concepts in more concrete terms. (Fig. 4, Photo 3) These guidelines reflect basic considerations for the design and planning stages of construction projects with the objective of reducing the impact on the global environment throughout

the entire life cycle of the building.

Furthermore, each NTT Group company is creating a guide for Green Design Guideline for Buildings.

The Green Design Guideline for Buildings define seven strategic concepts for NTT building design (1) extending building life, (2) restricting use of halon and CFCs, (3) restricting use and removal of harmful substances, (4) conservation of resources and energy, (5) reduction of waste, (6) promoting reuse and recycling and (7) consideration for local environment.

Green Purchasing

In line with our policy to prioritize environmentally friendly materials and components, the NTT Group makes an effort to take environmental impact into consideration when purchasing office supplies such as copy paper, stationery and office equipment.

Within the NTT Group, each group company and office has established its own policies to actively promote Green Purchasing. NTT (holding company), NTT EAST, NTT WEST, NTT Communications, NTT DoCoMo, and NTT DATA participate in the Green Purchase Network* (GPN), adopting GPN product guidelines to promote procurement of environmentally friendly office supplies.

Within all office products, the percentage of ecologically friendly products on the procurement list has reached 53%.

Photo 1

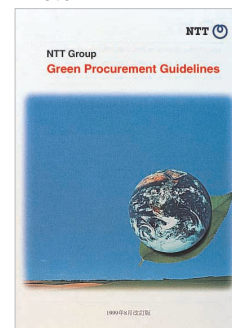


Photo 2

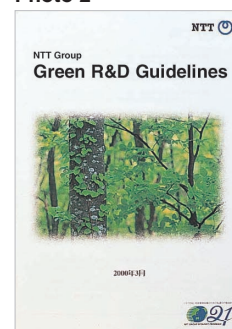


Photo 3

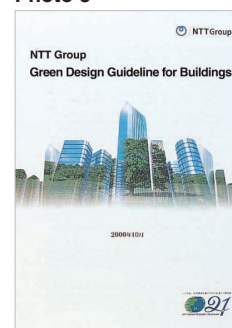


Fig.3 Steps for implementation of Green R&D Guidelines

* R&D management reflecting environmental concerns

* Development of products with reduced environmental impact

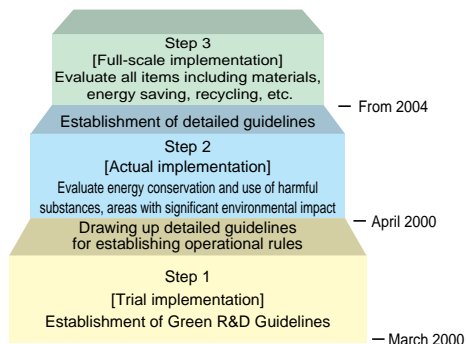
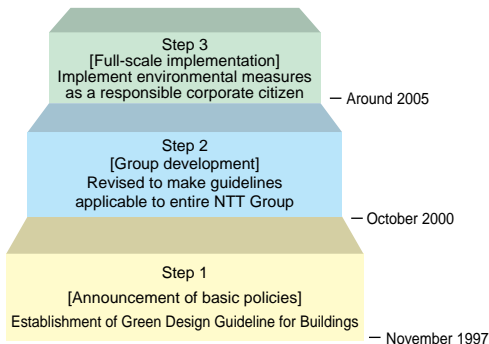


Fig.4 Steps for implementation of Green Design Guideline for Buildings



*Green Purchase Network (GPN)

A nationwide network of consumers, businesses, and government agencies who voluntarily promote priority purchasing of environmentally friendly products and services.

Paper Resource Measures

<http://www.ntt.co.jp/kankyo/e/2001report/2/241.html>

Protection of forests is a major topic in globally. This is because it holds the power to relieve air pollution and to hold off the progression of global warming. The NTT Group is making a significant effort to minimize consumption of paper resources, making an effective contribution to protecting our valuable forests.

The Utilization of Recycled Paper and a Reduction of the Use of Virgin Pulp

Efforts with Telephone Directories

Through the services to its customers, the NTT Group consumes large quantities of paper resources. In particular, some 125 million tele-

phone directories a year are published, consuming approximately 150,000 tons of paper. The NTT Group has been working since 1973 to economize paper resources. We have put a special effort in controlling the amount of virgin pulp used, reducing the amount from 90,000 tons in 1993 to 58,000 tons in 2000. In addition to this, according to the results of improvements in the percentage of used paper composition, we were able to raise the rate to 60%. (Fig. 1)

We are working to reduce our use of forest resources through various efforts such as revising the method of publication for Hello Pages, calculating an appropriate number to publish, and publishing a CD-ROM telephone directory*.

Telephone Directory Closed Loop Recycling

The "Telephone Directory Closed Loop Recycling" system which started this year aims at cyclically recycling old telephone directories into new telephone directories. In order for this recycling system to work efficiently, the collection of old telephone books is very important (Fig. 3). Therefore when new ones are delivered, we collect the old telephone directories.

Moreover, in December 1999 we began the "Eco-Challenge! Telephone Directory*," an activity to advance environmental measures for telephone directories (Photo 1).

*Telephone directories are published in periods of twelve months or eighteen months, depending on the year.

*CD-ROM telephone directory

A service to find telephone numbers through a CD-ROM (under testing)

*Eco-Challenge! Telephone Directory

Website address is <http://www.tpnet.nttds.co.jp/networks/kankyō>

Fig.1 Year-long amounts of paper used and virgin pulp used and the rate of used paper incorporation

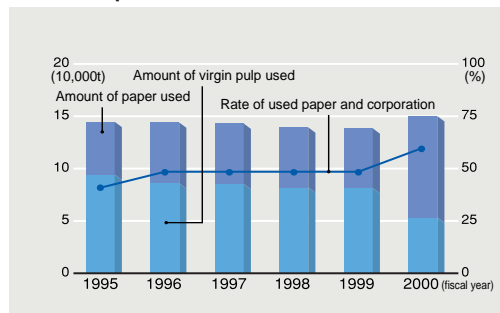


Fig.2 Telephone directory closed loop recycling (CLR)

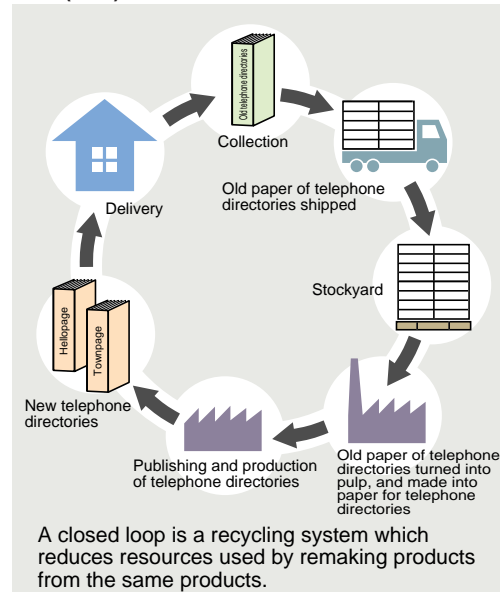


Fig.3 Amount of old telephone directories collected

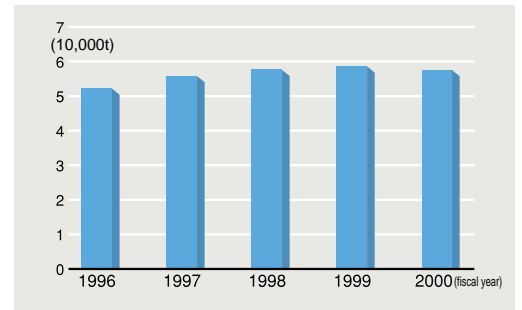


Photo 1 This logo mark identifies our Eco-Challenge! Telephone Directory





Efforts Within the Company to Utilize Recycled Paper and Reduce Virgin Pulp

We are utilizing recycled paper in various products. As for telegram boards our objective is to make the core of the boards from 100 % used paper and have over 40% of the entire board composed of old paper. Furthermore, the recycled paper content in customer invoices and invoice envelopes has reached 40 to 50%. Still we are raising the effects of reductions steadily by working intensely to reduce the use of virgin pulp within the company. We are including the meaning of raising each employee's awareness of paper resource reduction, introducing wood-free paper (100% Kenaf*) for business card materials depending on the office, and making unified efforts across all companies.

Fig.4 Screen for TOWNPAGE



Utilization of Electronic Media and Low-Impact Raw Materials

Utilizing the Internet

The NTT Group is expecting results by having widespread use of "TOWNPAGE," (Fig. 4) the Internet version of the telephone directory. Likewise, we are offering billing information such as monthly statements and telephone statements through the B-EDI Service. (Fig. 5) This B-EDI service can be downloaded through INS-Net, and we provide the needed data transmission completely free-of-charge.

Relieving the Impact on the Environment and Humans

We are promoting "Green Procurement," which uses raw materials that do not have an effect on the environment and humans. Furthermore, we are controlling the creation of harmful materials the like dioxin by using the material "OPS film*" (Photo 2) in the windows of invoice envelopes. We are using materials which comply with Welfare Ministry levels in the cloth for Winnie the Pooh DENPO (Photo 2) and Doraemon DENPO.

*Kenaf

Hibiscus cannabinus L. An annual plant which is gaining notice as a raw material for tree-free paper. It also absorbs large amounts of CO₂ through excellent photosynthesis.

*TOWNPAGE

The Internet address is <http://english.itp.ne.jp>

*OPS film

A plastic film which will not produce dioxin or other harmful materials even if it is burned.

Photo 2 Invoice envelope using OPS film

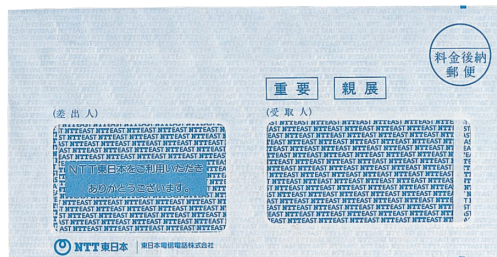


Fig.5 Image of B-EDI service

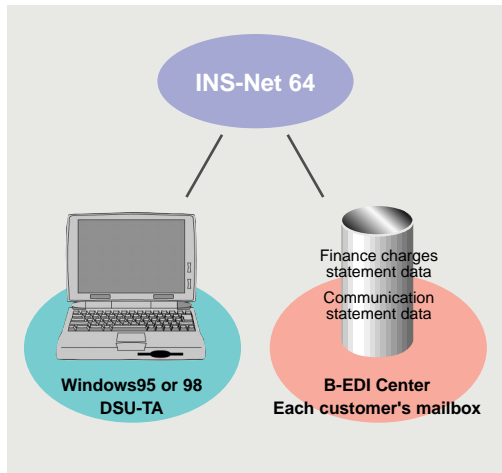


Photo 3 Winnie the Pooh DENPO



Preventing Global Warming

<http://www.ntt.co.jp/kankyo/e/2001report/2/251.html>

With worldwide rise of the concern about global warming, reducing emissions of carbon dioxide (CO₂) has become the most crucial goal in recent years. The NTT Group has considered tackling this issue as one of its corporate missions and has been engaged in various efforts to reduce consumption of electric power.

Total Power Revolution (TPR) with the NTT Group

The TPR* campaign has been implemented since October 1997 incorporating a decade worth of efforts to reduce consumption of electric power made by individual branches and departments into sweeping measures as a coherent group. This campaign can be classified into four major areas;

1. Energy Reduction Through R&D

We are advancing a wide area of research relating to changing communication devices to low power consumption and to the creation, conversion, transmission, and collection of energy.

2. Introduction of Facilities for Electricity Reduction

We are comprehensively researching and appropriately implementing methods for utilizing facilities designed for low energy consumption.

3. Use of Facilities for Electricity Reduction

We are managing the energy for each company and each office building-by-building and are implementing energy cost management within our daily activities.

4. Installation of an Optimal Energy System for Electricity Reduction

We have introduced co-generation* systems (CGS) which have high rates of energy production efficiency and waste heat recovery. In 2000, we improved our rate of electric self-sufficiency to 3%, twice that of our previous results.

We also proposed a "Vision for Electric Energy Reduction for 2010" in February 1998, to ensure this campaign's effectiveness. The TPR campaign made it possible to slow down

***Total Power Revolution**
A campaign to reduce consumption of electric power, which the NTT Group has promoted since October 1997.

***Co-generation**
An energy preservation system to use heat energy produced by gas turbines and diesel engines.

Fig.1 CO₂ emissions produced in connection with NTT Group electricity consumption and power generation

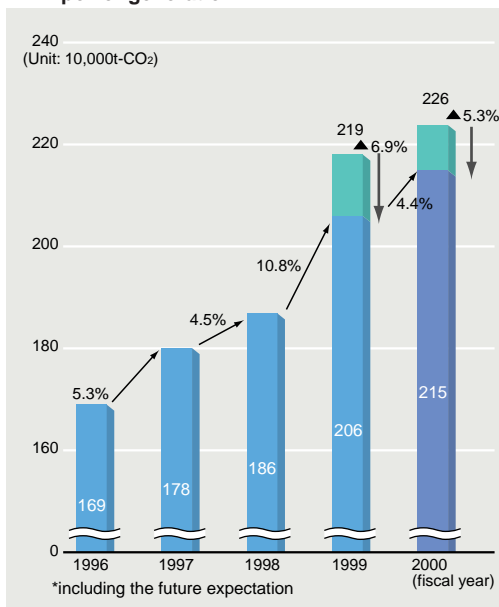
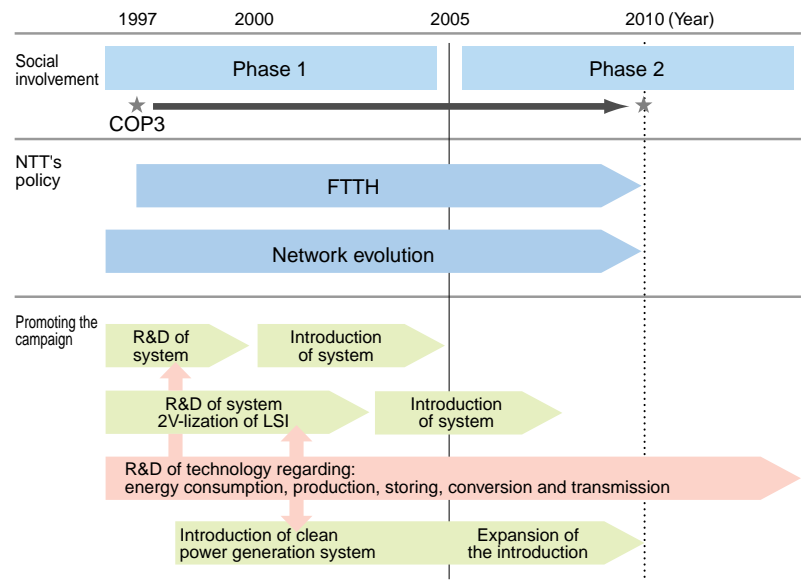


Fig.2 Progress of TPR campaign





the increase in CO₂ emissions in fiscal year 2000 to 4.4 %, less than half of the estimated 9.7 %. (Fig. 1)

The NTT group hopes to achieve its target by 2010. (Fig. 2)

Environment-Friendly Facility "Forest of CRED"

In April 2001, NTT Urban Development Co. opened "Forest of CRED," an open-air garden inhabited by birds, fish, insects and animals. This garden is located on the sixth floor of NTT Motomachi CRED Building in Hiroshima City. A recycling filtration system provides clean water, which creates an ideal environment for killifish and fireflies. Moreover, some thirty nest boxes are planted on box trees and other evergreen trees, and visitors may observe birds hatching eggs. This facility provides fresh air in the urban area as well as a recreation spot. (Photo 1)

Introduction of Photovoltaic and Wind Power Generation Systems

In March 1996, the NTT Group introduced one of the world's largest photovoltaic power generation system, which can produce 555 kW, at the present NTT EAST Training Center in Chofu City, Tokyo. (Photo 2) By March 2001, the NTT Group also had installed an additional 89 photovoltaic power generation systems in various areas of Japan. These facilities supply approximately 1,600,000 kWh of electricity annually, which translates into a reduction of

Photo 1 "Forest of CRED" nature existing in the middle of an urban area



some 570 tons of carbon dioxide emissions. In addition, we have six wind power generation systems. Our efforts continue on this front.

Introduction of Stand-alone Power Systems

We have introduced stand-alone power systems based on the use of photovoltaic power generation in NTT DoCoMo's wireless station at Chihoku-toge in Hokkaido and eight other locations since December 1999. Analysis of past meteorological data and research on supply reliability using power generative simulations have made it possible to create a highly reliable electric power system from photovoltaic energy.

Anti-Idling Campaign and Minimizing CO₂ Emissions from Company Vehicles

Helping Japan's target of reducing 6 % of emissions of greenhouse gases set in the 1997 Kyoto Protocol,* the NTT Group has set its own target to decrease the amount of CO₂ emitted by company vehicles below the 1990 level. To do so, we have promoted an anti-idling campaign (TAKO ZERO campaign) (Photo 3), introduced low-pollution vehicles and reduced the number of vehicles in our fleet by means of efficient use. These efforts will curb the amount of emissions of blacksmokes and nitrogen oxide (NO_x)* as well as CO₂.

*Kyoto Protocol

An official agreement of the United Nations Framework Convention on Climate Change held in Kyoto in 1997. The agreement has set a target of reducing the amount of greenhouse gases emitted by thirty eight nations and the EU.

*NO_x

It can cause health hazards. It produces photochemical oxidants through photochemical reactions caused by ultraviolet rays.

Photo 2 Photovoltaic power generation system



Photo 3 "TAKO ZERO" anti-idling campaign mark



Recycle Propulsion

<http://www.ntt.co.jp/kankyo/e/2001report/2/261.html>

It has been 10 years since Law for Recycling began. Recycling is a major project in the wake of the Law for Recycling of Specified Kinds of Home Appliances* that began in 2001. The NTT Group is continuing to recycle various things – starting from communication facilities – with maximum efficiency.

Re-Using Dismantled Communication Facilities

The NTT Group is re-using things which are capable of being recycled such as telephone poles, public phones and communication cables by registering information to an in-house LAN and sharing information.

Also the NTT Group is recycling copper, iron and other metals used in communication cables and facilities. It is also promoting the use of concrete electric poles and recycling batteries.

Recycling plastics is a major undertaking in the current recycling market, because of the costs of separating new materials. The NTT Group is trying to proceed under the principle "action is the only alternative." For recycling plastics, the NTT Group first looks to see if recycled materials can be used in-house before

attempting to sell them in the open market-place.

Also, the NTT Group contributes plastic to be used for cement or steel production as energy recovery. The NTT Group takes what is called the "Three R's" program to dismantling – Reduction of waste volume, Reuse and Recycling. In addition, the group is working to circulate materials as much as possible, and avoiding the creation of waste.

Uniform Recycling

NTT WEST is recycling used uniforms as soundproofing material for automobiles. Instead of discarding them, uniforms are collected and sent to a subcontractor four times a year. There, they are cut, garnetted (recycled into fiber components) and made into felt. These felt materials are then made into soundproofing materials used between the body and seating of a car. (Photo 1) To avoid the unnecessary release of dioxins in the air, NTT WEST enforces recycling, a step toward a society where materials are recycled*. This know-how is being introduced and actively promoted to each group inside the entire NTT company.

*Law for Recycling

The formal name is "Law for Promotion of Effective Use of Resources". It was begun in 1991 to promote recycling.

*Law for Recycling of Specified Kinds of Home Appliances

It is the law enforced to establish a "recycling-based society." The four targeted objects are air conditioners, televisions, refrigerators and washing machines.

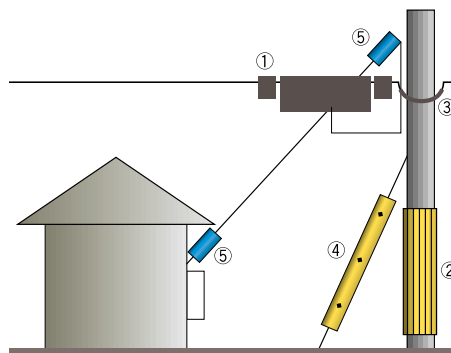
*Energy recovery

The technologies collects the heat resources such as steam and warm water to warm water and the energy for the coolers by burning abandoned plastics.

*Recycling-based society

Society regulates waste disposal; and commercial goods should be re-circulated as resources.

Fig.1 The case for the material recycling of the plastic goods



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

Photo 1 Used uniform recycling



"DoCoMo Come-Back" Hardware Recycling Program

The components of NTT DoCoMo Group hardware components are completely recyclable. Even after its usefulness is over, it is an efficient source of its own materials. To realize this plan, NTT DoCoMo Group actively promotes a collecting and recycling campaign called, "DoCoMo Come Back." (Photo 2, Fig.2)

The used goods such as cellular phones, the terminal units of car telephones, battery packs

and chargers are collected at NTT DoCoMo shops in collaboration with customers.

Cellular phones and PHS phones are sorted by recycling companies and processed to be recycled by burning and pulverizing. Gold and silver are extracted from the base of the cellular phones. The metal parts of the batteries are processed into lumps of nickel, cobalt and cadmium by separating and smelting. Nickel becomes stainless steel, cobalt is converted into magnets for speakers and cadmium is processed into Ni-Cd batteries. (Fig.3)

Recycling these materials is certainly a first step toward realizing a "recycling-based society".

Food (Kitchen Refuse) Recycling

NTT-ME commercialized the Bio-Runner, a kitchen refuse high speed fermentation disposal machine which recycles a kitchen refuse into fertilizer, improved soil and feed. The Bio-Runner is a disposal machine which is able to ferment all kinds of kitchen refuses in 24 to 48 hours by using bacterial materials (several dozens kinds of bacteria) without creating any harmful materials.

Things generated from the machine are confirmed safe for human use, and can be used as material for the organic fertilizer or material to improve the soil. This is a recycling system which realize a circulating society without any environmental pollution.

Photo 2 "Docomo Come Back" poster



Fig.2 The situation of the collecting of terminal units NTT DoCoMo Group

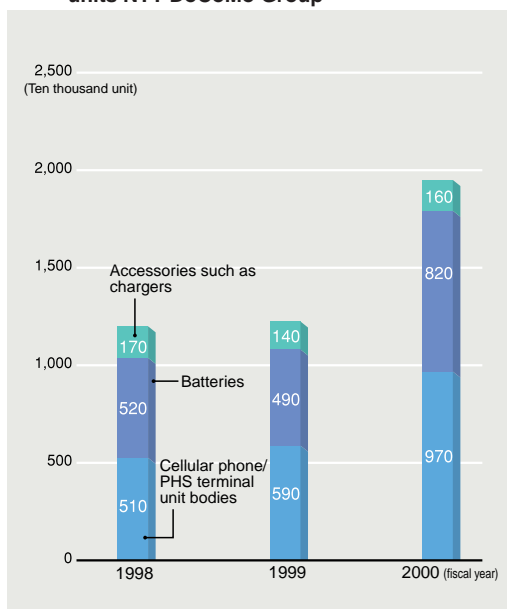
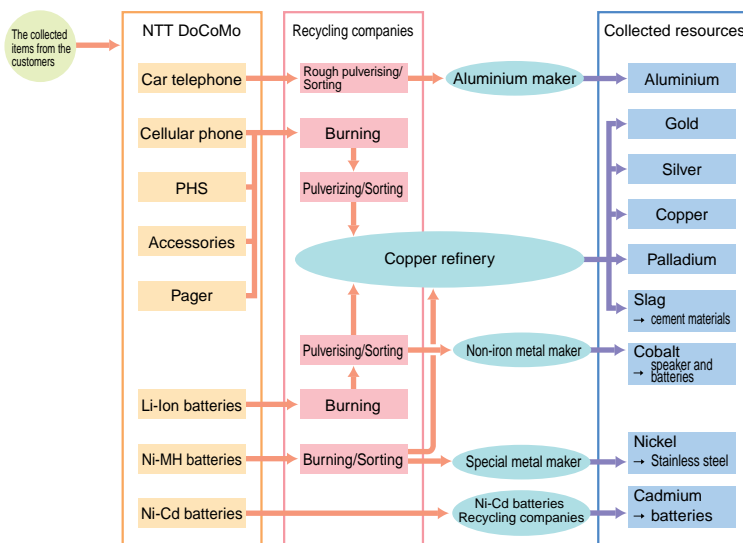


Fig.3 Recycling flow of the terminal units



Waste Measures

<http://www.ntt.co.jp/kankyo/e/2001report/2/271.html>

In order to prevent global warming and poisonous gas emissions, it is urgent that the NTT Group controls waste and deals with appropriate waste disposal.

The NTT Group is actively dealing with waste with the intention of not using our limited resources.

The Treatment and Management of PCBs

PCB* (polychlorinated biphenyl) is a poisonous chemical which does not decompose easily in the environment and accumulates inside the fat of the living things. Japan banned its production in 1974. However, since then there have been no radical reforms, and independent reduction has become an obligation for businesspeople.

From these conditions, NTT has promoted research to deal in-house with the PCBs which it stores and manages. It has become possible to implement a treatment to make PCBs harmless through a method of chemical decomposition that came from the reforming of waste treatment methods. Now we can safely breakdown currently stored PCBs and have decided to avoid the current conditions of risking envi-

ronmental pollution. In the future, we are planning to begin creating treatment with the cooperation of local governing bodies.

Tracking Waste Treatment Procedures by GPS

Illegal dumping of industrial waste is developing into a social problem, but with a revision of the law, it has been decided that people in the waste elimination industry will check on waste treatment through the "Industrial Waste Management (Manifest*)" which was created by the people in the treatment industry. However, the situation is still not perfect for stopping illegal dumping as the checking is done only on paper.

NTT-ME is working on the selection of businesses and duties of management for the treatment of industrial waste created in the Kanto Koshinetsu area of NTT EAST, and we have selectively witnessed the processes in order to check the treatment conditions for this waste.

As a result, NTT-ME introduced a system which can successively check through the Internet the situation of waste treatment and transport using GPS (Global Positioning System) and digital images, and it has commenced offering it as "the Industrial Waste Image Tracking Service." The disposal workers, even though they are there, can check the progress of treatment through recorded images and routes. (Fig. 1)

The following effects have been obtained through this service:

1. The prevention of illegal dumping by directing transport vehicle behavior and packing methods.
2. Verifying legal and appropriate treatment by analyzing the treatment process through the images and weight.

If this service is used widely, it will become a strong preventative measure against illegal dumping, and at the same time by actively advancing resource collection and recycling. In this way, we can contribute to a cyclical society.

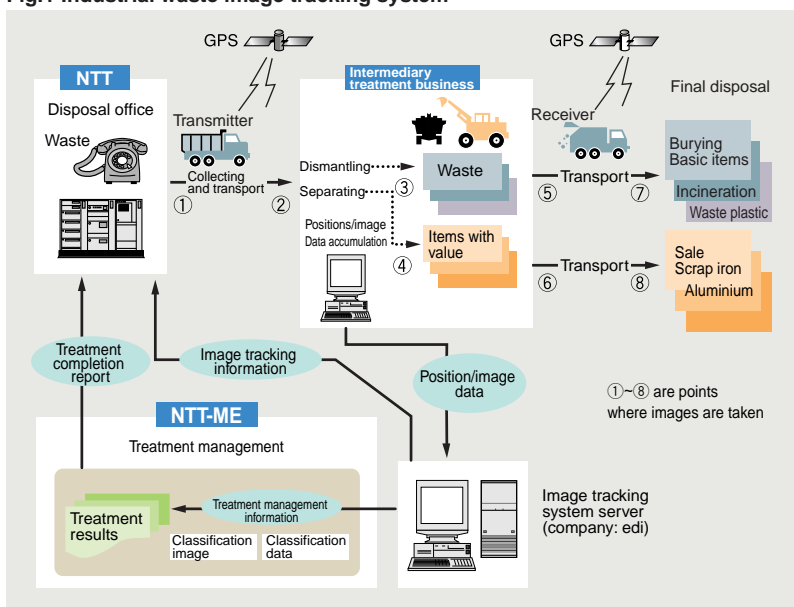
***PCB**

Polychlorinated biphenyl. It has been used in transformers and condensers for its excellent insulating quality. However, it is highly poisonous, and it has recently been noticed as an environmental hormone.

***Manifest**

Industrial waste management charter which confirms the flow of industrial waste when the treatment of building waste is assigned. Applied widely to all industrial waste from December 1, 1998.

Fig.1 Industrial waste image tracking system



Protecting the Ozone Layer

<http://www.ntt.co.jp/kankyo/e/2001report/2/281.html>

The problem of ozone holes threatens the existence of all animals on the earth and is an important global topic. We are actively taking steps with CFC regulation activities to protect the ozone layer, and we are dealing with the CFCs which we already hold in a safe manner.

Replacement of Turbo Freezers and Maintenance of Internal CFC Banks

Turbo Freezers Which Used Specified CFCs

In 1992, the Fourth Conference at the Parties to the Montreal Protocol set forth the schedule for a reduction of specified CFCs*. It completely abolished specified CFCs by the end of 1995 and abolished substitute HCFCs in principle by 2020. Following this, the NTT Group determined our basic policies in November 1992. They are to cease installation of new turbo freezers using specified CFCs and to replace the majority of existing turbo freezers by the year 2000. When this decision was made, 166 turbo freezers required replacing in four companies of the reorganized NTT. Reductions accumulate every year, and as of year-end 2000, only 4 remain. The rate of replacement has reached 98%. (Fig. 1)

CFC Banks and Specified CFC Treatment

Since July 1994, specified CFCs have been managed effectively at CFC banks which the NTT Group's internal CFC bank machinery controls. Destruction of specified CFCs was carried out in fiscal 2000. There are about 46 tons of specified CFCs held in the five CFC banks throughout Japan. This is dealt with appropriately based on the CFC Decomposition Guidelines* prepared by the former Air Quality Preservation Bureau of the Environmental Agency. For dealing with specified CFCs, we selected a heated steam reaction method and combustion method of decomposition for its safety and high decomposition efficiency. (Fig. 2)

***specified CFCs**

CFC. A material which damages the ozone layer of the stratosphere.

***substitute CFCs**

HCFC. Chemical developed as a substitute for specified CFCs. They do not harm the ozone layer, but the effects causing global warming are billions of times higher than that of CO₂.

***CFC Decomposition Guidelines**

Guideline for dealing with specified CFCs which were prepared by the former Environmental agency.

Fig.1 Replacement schedule for turbo freezers using specified CFCs

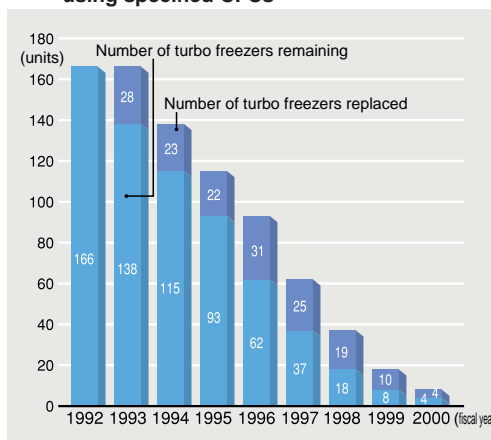
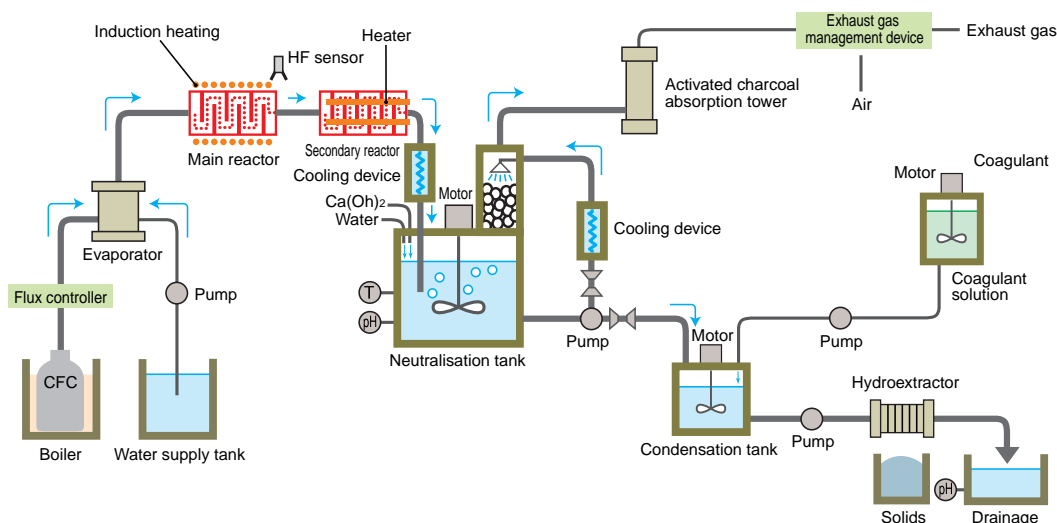


Fig.2 System flow for CFC destruction machinery by the heated steam reaction method



■ Minimizing Environmental Risks

<http://www.ntt.co.jp/kankyo/e/2001report/2/291.html>

NTT Group, a leading company in information sharing services, actively participates in investigating and researching the interactions between electromagnetic waves and various environmental issues, which make people worry about cellular telecommunications.

Research Regarding Electromagnetic Waves

With the spread of cellular phones, the proliferation of radio transmissions created by cellular phones and base stations has led to mounting concerns about the adverse effects of radio waves upon humans. When considering such effects, we need to separate physiological effects on humans as living organisms from the effect on electronic medical equipment, such as pacemakers, and other electronic devices.

Utilization of Environmentally-Friendly Radio Waves

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 adversely affect humans. The WHO is recommending using these as the maximum limitations for safe use of electromagnetic waves. Based upon various countries' recommendations including ICNIRP* guidelines, the Telecommunications Technology Council has submitted reports outlining guidelines for protecting humans when using radio waves in Japan. Following this, the Ministry of Public Management, Home Affairs, Posts and Telecommunications has already systematized the creation of guide values for base stations, and has announced that it will implement rules for cellular phones from 2002.

NTT DoCoMo thinks that it is most important to utilize radio waves strictly in compliance with these guidelines.

DoCoMo cellular phones are designed so that electromagnetic power absorbed by human users is well below the guide values.

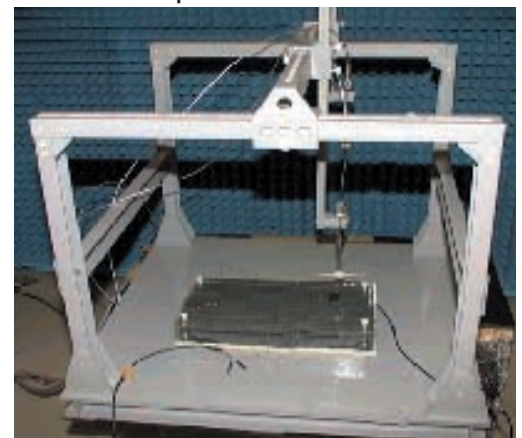
Electromagnetic Waves and Medical Equipment

NTT DoCoMo has made active efforts to ensure that its cellular phone radio wave does not adversely affect medical equipment such as pacemakers. As part of these efforts, we have conducted research to develop testing equipment and measurement methods to accurately assess the radio interference effects on implantable cardiac pacemakers. (Photo.1) Using developed testing equipment and protocol, all types of pacemakers and DoCoMo cellular phones available in Japan have been checked. Based upon obtained data, the Japan Pacemaker Committee has developed the safety guideline for using cellular phones. This guideline permits people with pacemakers to use cellular phones without any radio interference if the cellular phone is kept at least 22 cm away.

Currently, experiments and research of radio interactions between FOMA* cellular phones and new pacemakers are being conducted. Within those experiments, insofar as introducing safety guidelines, it has been confirmed that people using pacemakers are able to use any FOMA* cellular phones safely.

There is much information about electromagnetic waves, but the NTT DoCoMo Group is confident that customers can use DoCoMo cellular phones with peace of mind.

Photo.1 Radio Interference testing equipment for Implantable cardiac pacemaker and cellular phone



*International Commission on Non-Ionizing Radiation Protection

A specialized international commission that is one of the cooperation organs of the WHO and established in 1992. They study the biological effects of non-ionizing radiations and act to create international guidelines for human protection from non-ionizing radiation exposure.

*FOMA

Will begin testing usage in Tokyo and Yokohama in 2001 of next generation cellular phones.