

Chapter 2

Activities by Each Entity Towards Construction of a Socio Economic System with Minimum Environment Load

<Summary of Chapter 2>

Many of today's environmental problems are caused by the daily life of citizens and business activities, and thus the problems are caused by many and unspecified entities. To realize a sustainable society, each entity's unit such as citizens, enterprises, and the government must take active measures towards a reduction of the environment load voluntarily in all the aspects of the society.

This chapter examines the background and the awareness regarding the various new activities that are being started by each entity such as citizens, enterprises, and the government.

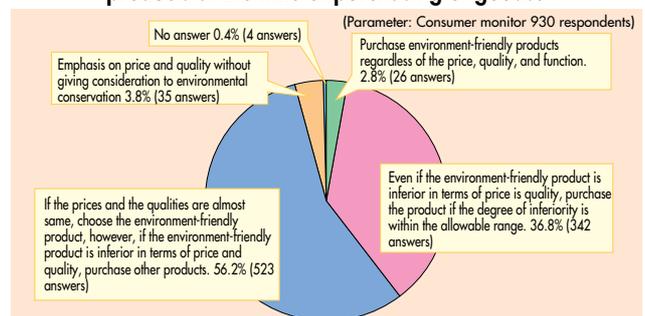
1. Change of Activities by Citizens

1) Change of awareness and behavior

Recently, a new factor called consideration of the environment has been added to the decision-making factors of consumers at the purchase point of goods. For instance, according to the replies of the survey, about 95% of consumers consider environmental conservation when purchasing goods. About 70% of consumers indicated that they would purchase environmentally concerned goods even if they are more expensive than other goods. With a change of awareness such as this, measures for providing environmental information of goods has provided support for the green purchase movement that gives higher priority to products and services of low environment load at the time of purchasing. Such a change is influencing the market and, for fifteen product fields that are the major targets of green purchase, the sales volume of the environmentally concerned products account for 30% of the total sales volume.

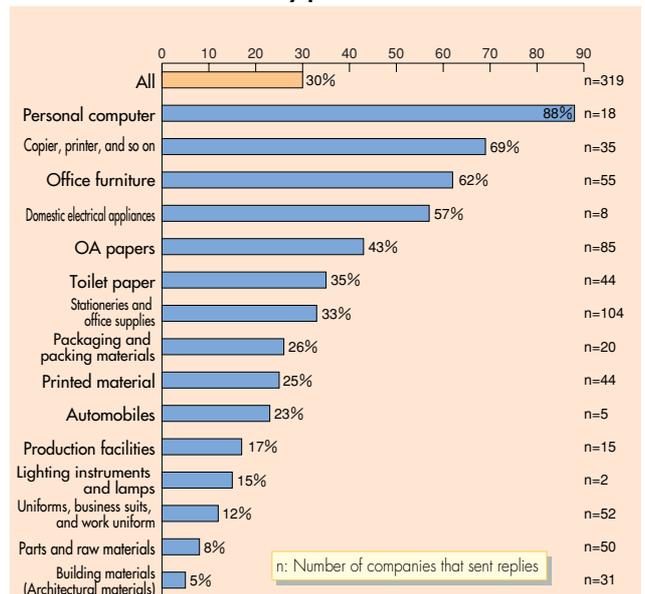
Such a change of awareness and behavior towards purchase by consumers has changed the role of enterprises in the society in response to request by the citizens, and some survey results shows that about 70% of those replied indicated environmental protection as the efforts to be made by enterprises to gain social credibility. With a such level of concern by the citizens as the background, there have been some external movements to assess which enterprises are giving considerations to environmental issues and to what extent, such as rewarding the measures taken by enterprises for environmental conservation and establishment of a ranking of environmental management.

To what extent is consideration given to environment-friendly products at the time of purchasing of goods?



Source: "Report on the investigations of actual conditions regarding advertisement considering environmental consideration" by Bureau of Fair Trade Commission (March 2001)

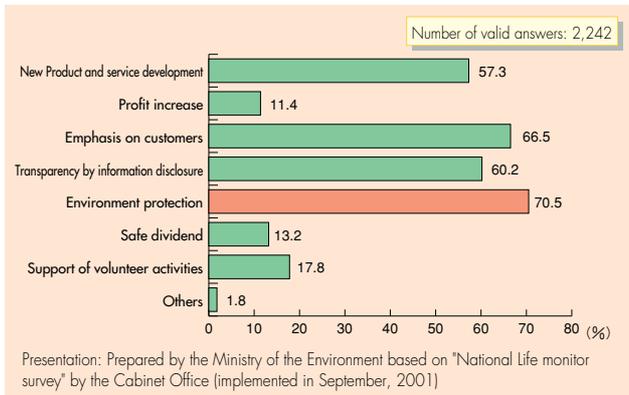
Ratio of environment-friendly products to the total sales volume



Note: Result of the questionnaires sent to the manufacturers and distributors of environment-friendly products of 15 main product fields that are targeted by Law on Promotion of Green Purchasing regarding the ratio of the sales volume of the environment-friendly products to the total sales volume

Source: "The 6th Green Purchase Questionnaire Survey Result Report" by the Green Purchase Network (Survey period: October and November 2001)

Items that should be targeted by enterprises in the future to obtain social credence



In this way, the increase of the interest of citizens towards the environment not only changes goods purchasing activities but also becomes the background of behavioral change of enterprises, thereby changing the market by increasing the range of the type of goods that are environmentally friendly.

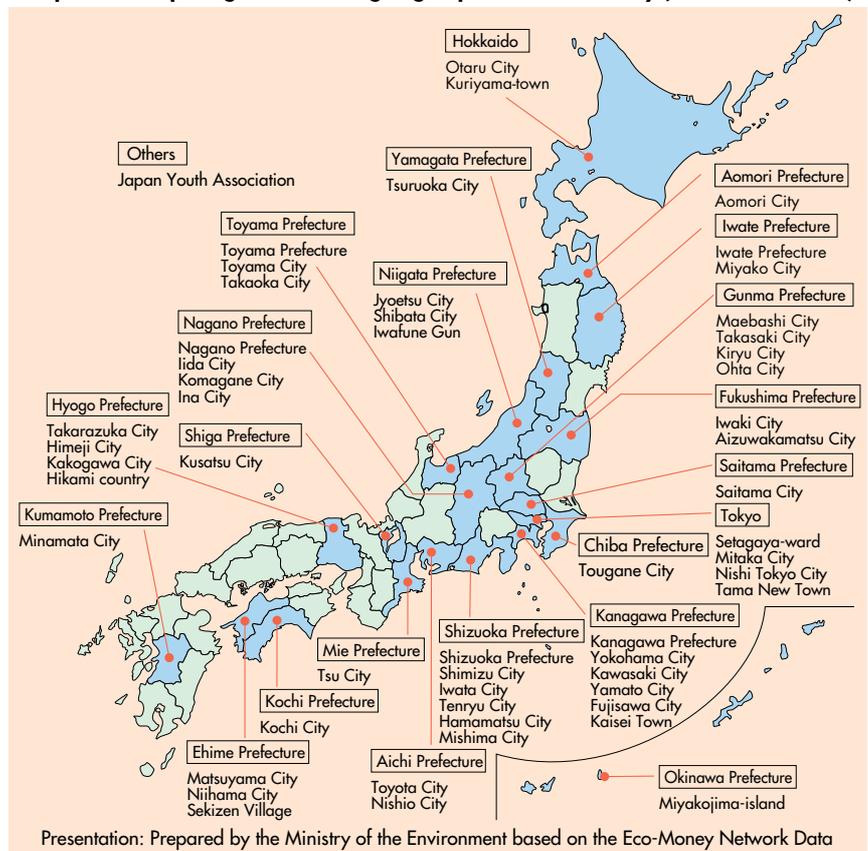
2) Possibility of further reduction of environment load by citizens

The changes of the awareness of citizens are represented by various measures that are taken for environmental conservation and are demonstrated in various areas nationwide. There are many unique examples for promoting the "environmentally concerned life style." Various activities that are taken nationwide such as the example from Kawaguchi City that has nominated one day a year as the "Eco-life day for the City" to enable participation by anyone; the example of Hamatonbetsu in Hokkaido a wind power station was constructed as the citizens joint development, and the example of Kuriyama-town of Hokkaido where a local currency (eco-money) is issued to activate exchange of services that cannot create market values easily, such as environmental conservation through the initiative of local residents.

In spite of such measures, the energy consumption in the household sector is increasing as indicated in Chapter 1. This is because the nation's awareness towards various measure for reduction of environment load (such as energy conservation) is still insufficient to control the increase of the environment load by each household, such as the spread of household electrical appliances and the tendency towards larger capacities.

In this modern age where the actions taken by each citizen are critical, it has become necessary to realize the "eco-living", which reforms the modern life style that causes environmental problems to a more environmentally concerned and more humanistic and rich life style for everybody. From such a standpoint, Conference on "Wa-no-Kuni-Kurashi" (<http://www.wanokurashi.ne.jp>) was established for the participation of opinion leaders of each industry, particularly regarding global warming problems.

Map of the major regions that are going to promote eco-money (as of March 2002)



Global warming countermeasures by individual actions

The following measures taken at home can reduce greenhouse gas emission by 2.8% in Japan (1990)

(CO₂ conversion)

| | Example of measures | Annual CO ₂ reduction per household | Reduction ratio to annual emission per household (%) | Annual conservation effect per household | Remarks |
|----|---|--|--|--|---|
| 1 | Set a cooler temperature 1oC higher and a heater temperature 1oC lower. | About 31kg/year | 0.5% | About 2,000 yen/year | By adjusting sunlight using curtains and clothes, the use of a cooler and a heater can be reduced in day-to-day living. Delay the starting time of a cooler and a heater. |
| 2 | Refrain from driving a car for a return trip of a distance of 8km twice a week. | About 185kg/year | 3.1% | About 8,000 yen/year | Use buses, railways, and bicycles for commuting and shopping. Walking and bicycling are also good for the health. |
| 3 | Idling Stop for 5 minutes a day. | About 39kg/year | 0.7% | About 2,000 yen/year | Turn off the engine while parking or stopping a vehicle for a long time. This also contributes to a reduction of air pollutants. |
| 4 | Reduce standby power by 90%. | About 87kg/year | 1.5% | About 6,000 yen/year | Turn off the main power supply. When not using power for a long time, pull out the cable from the outlet. When replacing electrical appliances, choose products of low standby power. |
| 5 | The showering period is reduced by one minute per day by each member of the family. | About 65kg/year | 1.1% | About 4,000 yen/year | Be careful not to leave hot water running while washing your body. |
| 6 | Utilize bath water for washing clothes. | About 17kg/year | 0.3% | About 5,000 yen/year | Some utilize used bath water for washing clothes, watering plants, and flushing toilets. Commercially available pumps are useful for recycling used hot water. |
| 7 | Turn off the simmering function of cooking pots. | About 31kg/year | 0.5% | About 2,000 yen/year | Simmering of the contents in a pot or a jar consumes a lot of electricity for extended use. Re-heat rice with a microwave oven to reduce power consumption. |
| 8 | All the family members stay in one room to reduce the heating and lighting energy by 20%. | About 240kg/year | 4.1% | About 11,000 yen/year | Each member of the family requires extra heating and lighting energy if they are in different rooms. |
| 9 | Carry a shopping bag and choose items with less packaging (vegetables, and so on). | About 58kg/year | 1.0% | | Trays and wrapping materials become waste products at home. By carrying a shopping bag, consumption of plastic bags can be reduced. |
| 10 | Reduce the TV watching period by one hour. | About 13kg/year | 0.2% | About 1,000 yen/year | Choose only the TV programs that you wish to watch. |
| | Total | About 766kg/year | 13.0% | About 41,000 yen/year | |
| | Total effects in Japan | About 34.7 million tons/year | Reducing greenhouse gas emission of Japan by 2.8% (1990) | | |

Notes:

1. Annual CO₂ emission per household in Japan: About 5,900kg, Number of households in Japan: 47,420,000 (1999), Number of passenger vehicles in Japan: 40 million
 2. Method of calculating the total effects in Japan: reduction by the measures in vehicles (2, 3) x 40 million units + other measures x 47,420,000 (households) = 34.7 million tons
 3. Greenhouse gas emission of Japan in the Kyoto Protocol standard year: 1,223.8 million tons
- Source: "Familiar global warming countermeasures - 10 measures that can be made at home" by the Ministry of the Environment

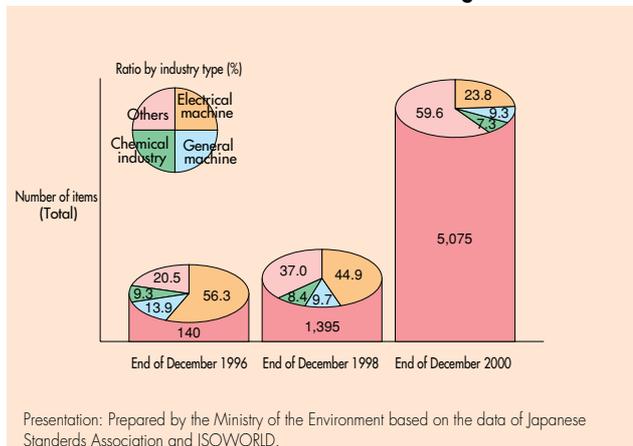
2. Change of Activities by Enterprises

1) Change of enterprises and the background

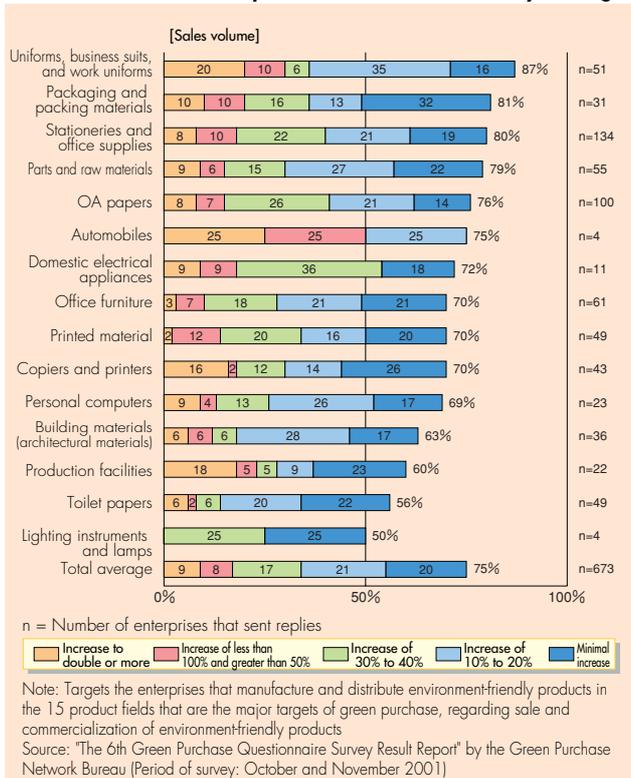
Recently, the concept of measures towards environmental conservation by enterprises has been changing to a more positive direction, from one of just social contribution to one of the most important business strategies.

As the background of such a concept for enterprises, there are the expansion of ISO14001 certification acquisition, progress of green purchase, and the spread of environmental reporting and environmental accounting. ISO14001, which is an international standard of the environmental management system, provides managers of enterprises with opportunities for examining measures on environmental conservation and for progressing with the

Transition of ISO14001 examination and registration items



Status of increase of sales volume of the products that were stored in the environment (compared to that of one or two years ago)



Transition of the number of enterprises and organizations that issued environmental reporting



reformation of the top-down concept. The number of certifications that were acquired in Japan reached about 8,000 as of the end of 2001. With the increase of the number of organizations that implement green purchase and sales of environment friendly products, some enterprises, which are suppliers of products and services, have started to implement green procurement and at the same time, such movements have become highly valued by the market in terms of environmental conservation. Corresponding to such a trend, enterprises have started to recognize the importance of environmental communication and more and more enterprises prepare environmental reporting each year.

The appearance of green consumers who choose environment-friendly products and shops and of green investors who take account of enterprises' environmental considerations for investments also promote positive measures of environmental conservation by enterprises. The Environmental Conservation Law that was recently enhanced includes many mechanisms for promoting voluntary environmental conservation by enterprises and some businesses tackle environment control.

In this way, various factors involving enterprises such as the markets, citizens and change of awareness, and measures taken by the Government are becoming more closely related to environmental conservation, having a profound impact on the concepts and actual measures taken by enterprises.

Recent laws and regulations regarding environment and examples of eco-business

| Year | Laws and regulations regarding the environment | Main movements such as eco-business |
|------|---|--|
| 1992 | Revision of Montreal Protocol (advancing CFC reduction) Establishment of Automobile NOx Law | Technical development of CFC avoidance advanced such as ozone depletion coefficient "zero" refrigerator Spread of development of lean-burn engine that satisfied both low fuel cost and low NOx emission and three-way catalyst |
| 1994 | Effectuation of the United Nations Framework Convention on Climate Change Ideal of zero emission by the United Nations University | Acceleration of development of energy conservation technology such as for electrical appliance manufacturers and automobile manufacturers Zero emission measures started in automobile, electrical appliances, and beer manufacturers. |
| 1996 | ISO14001 certification system | The ISO14001 certification acquisition support service, LCA support business, and environmental report creation support business were started. |
| 1997 | Revision of Waste Management and Public Cleansing Law (Review of the Manifest system) | Recycling and waste disposal support businesses are accelerated. |
| 1998 | Announcement of bioremediation environment influence assessment guideline | Promotion of bioremediation technology development |
| 1999 | Revision of Law Concerning the Rational Use of Energy and execution of Bill for the Promotion of Measures to Tackle Global Warming Announcement of Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management | Progress of technology development related to solar batteries and fuel cell batteries Development of chemical control systems such as for manufacturers of electrical appliances |
| 2000 | Execution of Law Concerning Special Measures for Dioxins Execution of Law for Promotion of Sorted Collection and Recycling of Containers and Packaging Announcement of Law on Promoting of Green Purchasing Announcement of Construction Materials Recycling Act Announcement of Food Recycling Law Held the 6th session of the Conference of the Parties (COP6) to the UNFCCC | Progress of modification (and new installation) of dioxin countermeasure waste incineration facility Development of business supporting Container and Packaging Recycling Law Acceleration of spread of environment-friendly products to the market Effort for zero-emission was started mainly by major general contractors. Raw garbage processing business accelerated. Trading business started to attract attention. |
| 2001 | Execution of Law for Recycling of Specified Kinds of Home Appliances | Consultancy business related to waste processing and recycling flourished. |

Presentation: Ministry of the Environment

2) Positive activities incorporating environment awareness in enterprise management

With the change of the business concept of enterprises that has been discussed above, most enterprises not only proceed with environment management by observing laws and regulations regarding environment law but also are moving towards positive introduction of the concept of environmental conservation into business management.

As an example of the new business, ESCO (Energy Service Company) comprehensively provides the technology, facilities, human resources, and funds that are required for energy conservation of buildings and factories and household electrical product rental business that focuses on the requirements for the services provided by products, not ownership of products. New products that were developed include eco-cement that is manufactured by using sewerage sludge and ashes from waste incineration as the raw materials and eco-fund, which is an environmentfriendly investment trust that makes investments by taking the measures for environmental problems by enterprises into consideration. In addition, examples of measures for reducing the environmental load of existing products include the soap industry, which is actively promoting the refilling of containers, and the copier industry where related enterprises cooperate with recovery of other products.

PSS (product and service system) classification (P=Product S=Service SC=System Change)

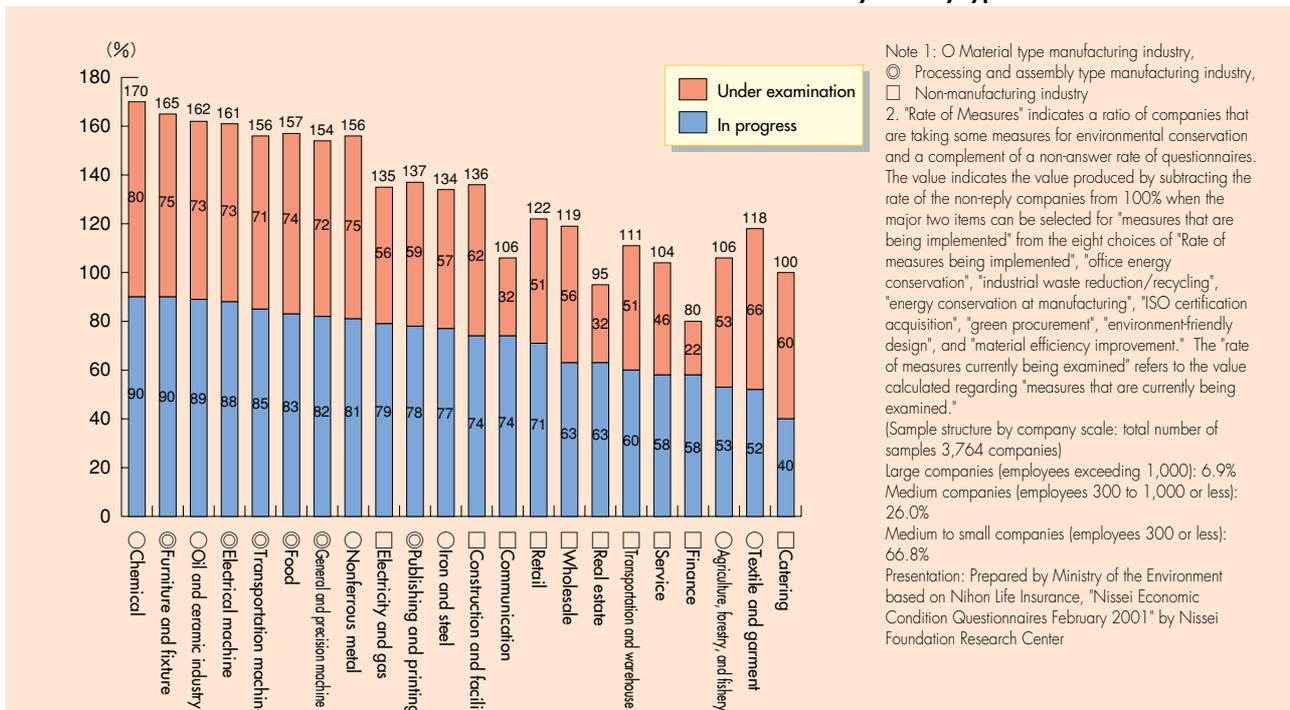
| |
|---|
| <p>Ⓟ Product with service attached</p> <ul style="list-style-type: none"> ● A service is provided at product delivery. ● A service is provided when the use of a product is determined or the life cycle reached. ● Forecast and recovery service |
| <p>Ⓢ Service with product attached</p> <ul style="list-style-type: none"> ● Product that is provided by the service provider such as free mobile phone |
| <p>Ⓟ The product and the service are equally important to satisfy certain requirements.</p> <ul style="list-style-type: none"> ● A product, an auxiliary facility, contents, and a service are provided to fully satisfy the requirements of the client. ● Sharing the use of a product part-time, part-time ownership, or a sharing a product ● Using and not owning the functions of a product |
| <p>Ⓢ System change</p> <ul style="list-style-type: none"> ● From coin to electronic wallet ● From sale of agricultural chemicals to guarantee of freedom from pests |

Presentation: Prepared by the Ministry of the Environment based on the "Sustainable Company" by Ryoichi Yamamoto

3) Differences of contents and reasons of activities taken for solving environmental problems by industry type

As discussed above, each company is making various measures for environmental conservation, however, the mechanisms of the measures vary according to the situation of the industry type to which the company belongs.

Rate of measures taken for environmental conservation by industry type

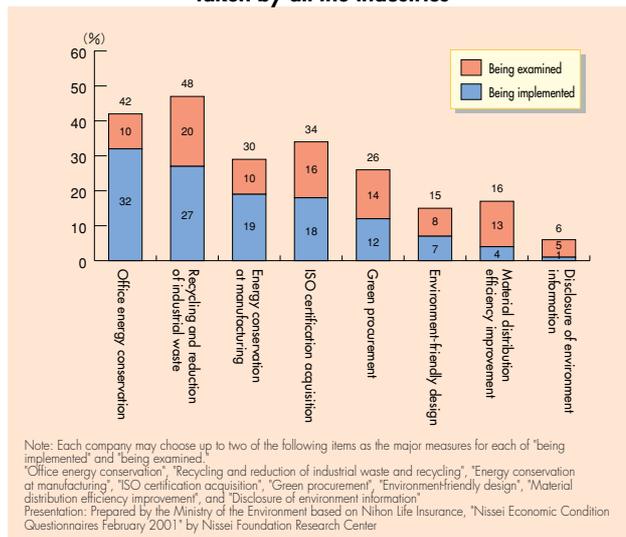


All the activities regarding environmental conservation were summarized and the rate of activities was checked by industry type. The result shows that some industry types consume a large amount of energy at the manufacturing stage and manufacturers of final finished products for consumers show high rates. Processing type manufacturing industries are relatively enthusiastic towards green procurement and environment-friendly design and non-manufacturing industries concentrate on office energy conservation.

We studied the proportion of activities that are being implemented and the proportion of activities that are being examined according to the contents. The result shows that the measures leading to cost reduction such as energy conservation at the manufacturing stage and reduction of industrial waste are implemented as the first stage in addition to the environmental effects. Then, the measures are spread to green procurement and environment-friendly design.

The contents of the activities taken by each industry and the difference of degree receive serious influence from the requirements of the prospective customers, such as business associates as customers and consumers and the condition of each industry. This indicates the possibility that the implementation status of activities taken by the downstream industries gradually influences the upstream industries within the complicated socio economic system, and the intentions and behaviors of the final consumers may change the actions taken by enterprises.

Contents of environmental conservation measures taken by all the industries

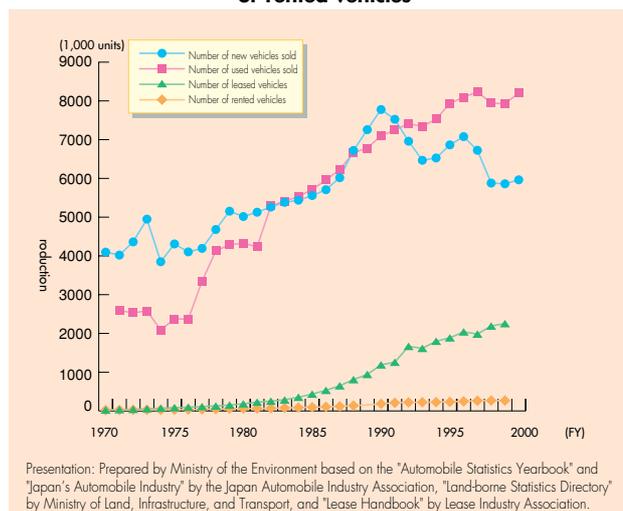


4) Conformity with revenue improvement measures of enterprises

Under the current difficult economic conditions, Japanese enterprises are working hard to improve their performance. Among the activities that are being taken, active improvement of management efficiency such as introduction of IT led to a reduction of environmental load and shift of the emphasis from sale of materials to sale of services, such as leasing contract of automobiles, various rental services, and sale of products integrating with repair reform service resulted in a reduction of environmental load. In this way, the direction of activities for performance improvement match that of measures for environmental conservation.

As discussed above, the situations surrounding enterprises further emphasize the relationship with the environment and environmental countermeasures are being recognized as business opportunities also, as well as mere constraints of activities.

Transition of the number of domestic vehicle sales and leased or rented vehicles



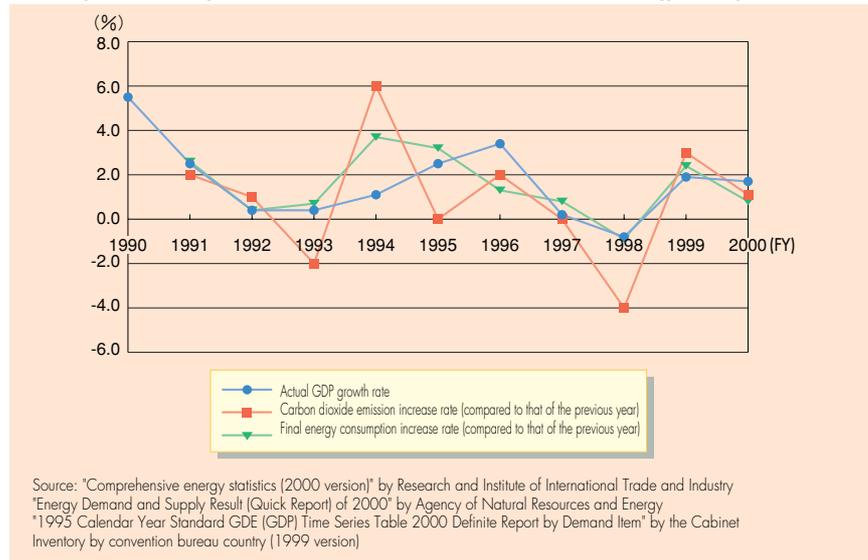
3. Change of Government Policies

1) Actual policies in each field

Today's environmental problems including global environmental problems are closely related to and cannot be separated from socio economic activities. To solve such new environmental problems, the Government is required to take a different approach from that for handling conventional industrial pollution, while considering the influence on socio economic activities.

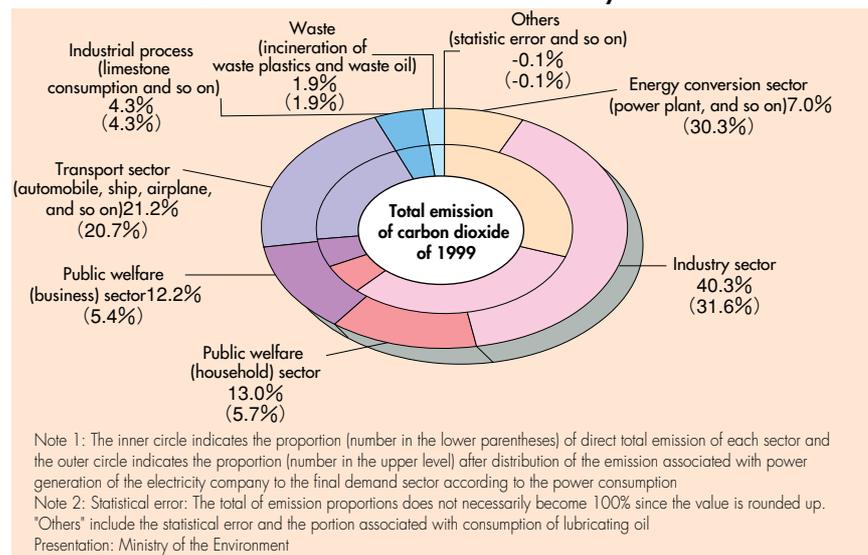
Regarding the global warming problem, as indicated in chapter 1, carbon dioxide emission that accounts for 90% of greenhouse gases, and economic growth are interrelated. Therefore, the Government has taken countermeasures that also achieve substantial results in aspects other than global warming prevention effects, and can be beneficial even if global warming does not occur. However, since the influence of global warming was found to be definite, further measures are necessary.

Relationship between GDP growth rate, carbon dioxide emission increase rate, and energy consumption increase rate



The "Outline for Promotion of Efforts to Prevent Global Warming" that was defined in March 2002 indicates implementation of each measure for achieving the 6% reduction as promised by transforming the situation to the reduction mode as quickly as possible by immediately implementing the measure that can be implemented at the current stage, then trying to achieve further reductions, and leading to further continuous emission reduction in the long term. The basic concepts of these measures that were presented include "co-existence of environment and economy", "step-by-step approach", "promotion of measures by integrating all the industries and levels", and "securing international linkage of global warming measures."

Breakdown of carbon dioxide emission by sector

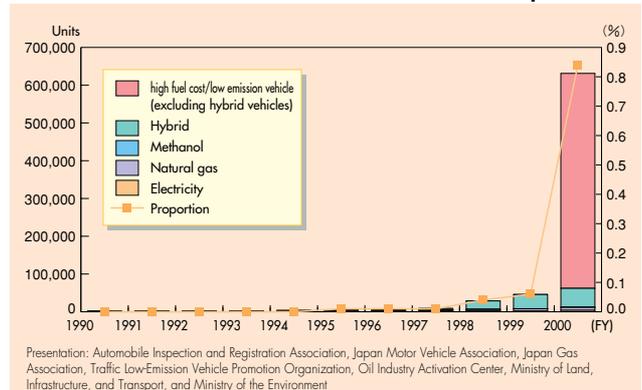


To achieve effective and efficient greenhouse gas emission reduction, it is important to use the concept of policy mix that combines various policy techniques organically. Above all, as one of the techniques for achieving high cost effective reduction, the economic technique of taxes and surcharges that persuade each subject to behave according to the economic rationality by granting economic incentives will be examined comprehensively, while giving consideration to the influence on the national economy and association with other countries, based on the market mechanism as the precondition.

For waste management and recycling problems, because there is a concern that the pressure of landfill sites and resource exhaustion may constrain economic activities, it is necessary to control the amount of resources extracted and reduce environmental load by promoting a recycling-based society. To achieve this objective, it is necessary to: -introduce and enhance the concept of "Extended Producer Responsibility" that producers take certain responsibility for appropriate recycling or disposal of their products of post-consumer stage, -increase the purchase of recycled products by the National government and other entities based on Green Purchase Law to secure sufficient demand for them, -consider the use of economic instruments such as unit-based pricing, tax and charge, and deposit-refund.

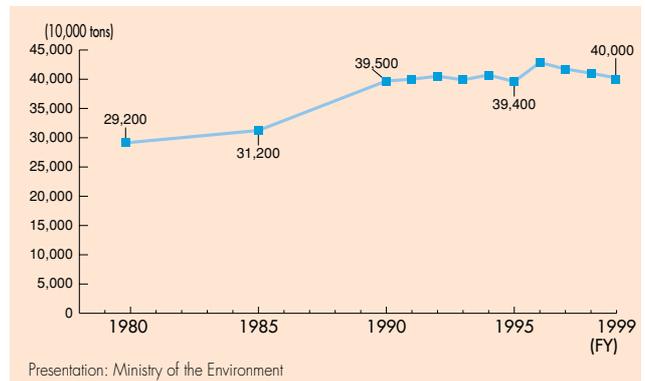
For the economic instruments, local governments are considering taxes regarding waste as local discretionary earmarked taxes that were created in 2000FY.

Transition and penetration rate of the number of low-emission vehicle ownership rate



Presentation: Automobile Inspection and Registration Association, Japan Motor Vehicle Association, Japan Gas Association, Traffic Low-Emission Vehicle Promotion Organization, Oil Industry Activation Center, Ministry of Land, Infrastructure, and Transport, and Ministry of the Environment

Transition of industrial waste emission



Presentation: Ministry of the Environment

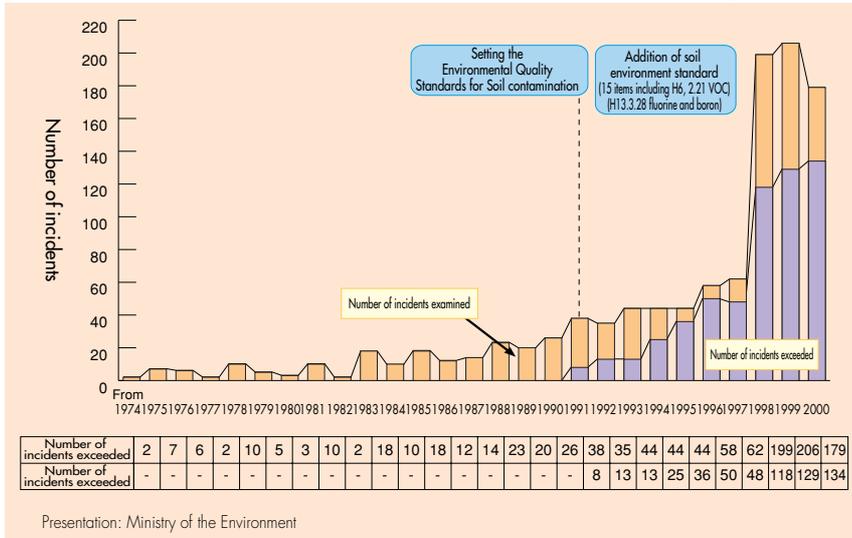
Examination status of tax system regarding wastes in local Governments

| | Tohoku North 3 prefectures (Aomori, Akita, Iwate) | Mie Prefecture | Tottori Prefecture | Fukuoka Prefecture | Kitakyushu City |
|-------------------------|---|---|--|--|--|
| Type Status | Industrial waste tax Prepare the draft during 2002 and regulated in 2003. | Industrial waste tax Enforced in April 2002 | Industrial waste tax Under examination | Industrial waste tax Under examination | Industrial waste tax Under examination |
| Tax payer | Draft A: Emission enterprise Draft B: Emission enterprise and intermediate processing enterprise | Industrial waste delivery agent from outside of the Prefecture | Emission enterprise (within and outside of the Prefecture) | Emission enterprise (within and outside of the Prefecture) | Final waste disposal enterprises and companies that treat wastes internally |
| Charge target | Draft A: Delivery to the intermediate processing facility and landfill site Draft B: Delivery to the landfill site | Delivery of industrial wastes to the Prefecture | Delivery to the intermediate processing facility and landfill site within the Prefecture | Delivering to the intermediate facility and landfill site The tax is exempted from the delivering to the intermediate waste processing site for recycling purpose | The amount of waste in the landfill site within the city |
| Tax payment method | — | Payment by self-assessment | Collected by the intermediate processing enterprise and final waste disposal enterprise in conjunction with the disposal fee | Self-assessment | Self-assessment |
| Tax rate | — | 1,000 yen/t However, for intermediate processing, multiply a coefficient considering emission reduction. | Intermediate processing About 100 yen/t Final waste disposal About 1,000 yen/t | 1,000 yen/t | 1,000 yen/t |
| Expected tax revenue | — | About 400 million yen | About 67 million yen | About 1,700 million yen | About 2000 million yen |
| Main use of tax revenue | Making prior consultation obligatory and responsibility of the party | Support of environmental industry and countermeasures for environmental load by industrial wastes | Cost of the industrial waste appropriate processing business and policies of the Prefecture | Support of development promotion such as technology and industrial activities, measures for urgent issues, and support of municipalities | Support of technology development and establishment of town that enable coexistence of waste processing and the environment and creation of a new environment industry |
| Others | duty-izing of prior consultaion and responsibility to participant of pollution | Review about five years after enforcement of the regulation | Review five years after enforcement of the regulations | | |

Note: Being examined by 34 local government among 98 prefectures and cities with Health Centers (as of January 2002)
Presentation: Ministry of the Environment

For soil contamination problems, with the recent increase of enterprises that are engaged in contamination examination at redevelopment and sale such as factories to be redeveloped and expansion and enhancement of constant monitoring of groundwater by local Governments, soil contamination by heavy metals and volatile organic compounds that have surfaced and the number of incidents of contamination is dramatically increasing. Immediate actions for soil contamination will reduce the cost for future countermeasures and activate the economy associated with land irrigation, as well as achieve environmental conservation effects, although it imposes some economic burden to the implementers such as elimination of contamination. In addition, expansion of new businesses associated with soil contamination countermeasures is expected and deliberation is currently in progress with the submission of the "Bill for soil contamination countermeasures."

Number of soil contamination incidents that were detected each year



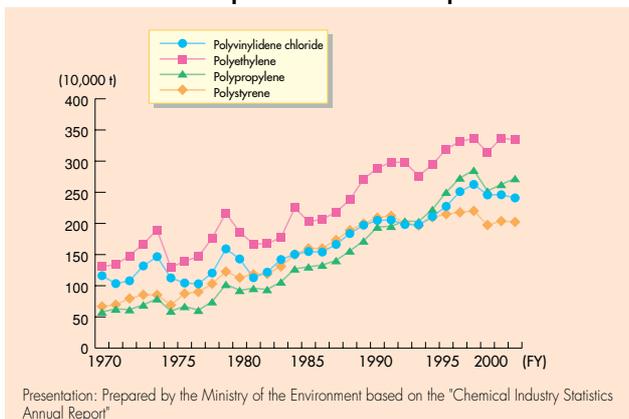
For the conservation of nature, the conventional discussions tend to revolve around the choice between protection or development. However, recently there have been many cases where the conservation of nature and regional revitalization can be integrated such as protection of Japanese crested ibis of Sado Island and designation of Yakushima as the world heritage site and other cases where environmental conservation measures and employment measures are integrated such as "Green employment business" of Wakayama Prefecture and "Shinshu Kikori Lecture" of Nagano Prefecture. Attempts for nature regeneration business have started through

active recovery of the natural resources that were lost.

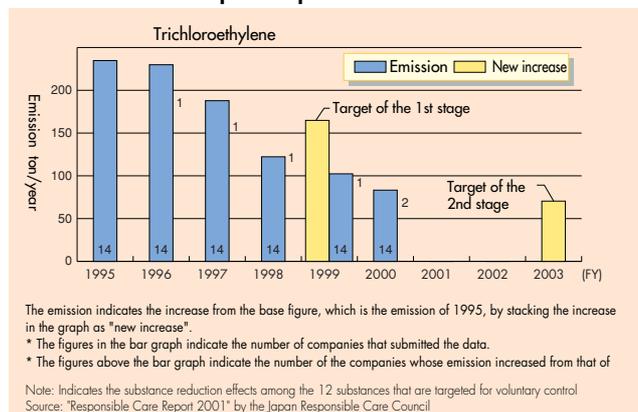
Concerning the problems arising from chemical substances, it is important to note how effectively and economically the environmental load caused by chemical substances even can be reduced taking into account that sufficient scientific explanation of the influence is not necessarily available. Initially, it is necessary to quantitatively assess the environmental risk, which is the risk of adverse influence of chemical substances on human health and the eco-system, to introduce the concept of reduction of environmental risk as a whole, and to take precautionary approaches to prevent the occurrence of irreversible changes, assuming the existence of some degree of uncertainty.

In addition, enterprises have started to take voluntary management such as Responsible Care activities without being restricted by legal regulations. Furthermore PRTR (Pollutant Release and Transfer Registers) was introduced whereby enterprises themselves check the emission and clarify the conditions such as emission of chemical substances to the environment, which is a fundamentally different method from the conventional regulatory method, such as promotion of further measures by enterprises.

Transition of production of four major resins



Example of activities taken by reducing harmful air contaminants in the Japan Responsible Care Council



2) Concept in proceeding with environmental countermeasures

As discussed above, various key concepts can be found in determining the basic skeleton of measures in each field of environmental problems. These concepts can be applied over a wide range more generally, not only to specific environmental problems. To handle current environmental problems, accurate measures are necessary by using these various concepts.