Business and Environmental Governance

Institute for Global Environmental Strategies

IGES

Preface

Since its inauguration in April 1998, the Institute for Global Environmental Strategies (IGES) has been carrying out research activities in five selected areas of strategic research, namely: climate change, forest conservation, urban environment, environmental education, and environmental governance, initially for the period of three years. Among the five, the Environmental Governance Project is aimed at conducting comparative analyses and assessment of national and regional environmental governance systems in Asia, with a view to making concrete strategic policy recommendations for improved environmental governance in the Asian region toward the 21st century.

The term "environmental governance" as used here refers to the totality of processes leading to the formation and implementation of rules, norms and institutions by not only national and local governments but also private enterprises, non-governmental organizations (NGOs), and the civil society at large. The private businesses in particular, through their corporate activities such as production, distribution, sale, use, consumption, and waste generation, make a great impact on the environment, while at the same time they are contributing greatly to the joint efforts being made by the society to improve the quality of the environment in which we all live.

The private business and industry in Japan has developed and expanded tremendously during the period of post-war recovery and rapid economic growth, but in the process created problems of rampant industrial pollution all over the country. First, it was in 1950s that, faced with public outcry against pollution, the local governments concerned started to regulate industrial activities and take other measures to control pollution. In the late 50s to early 60s, the national government followed in their wake by enacting and consolidating various pollution control legislation. In the 70s they continued to be strengthened and pollution control investment by private enterprises reached its peak in the mid-70s. Thereafter, with the progress of environmental administration supported by enormous efforts of business and industry, some of the severe problems of local industrial pollution were resolved or abated, while the more complex problems of urban, lifestyle-related environmental quality began to loom large, thus expanding and diversifying the range of policy issues to be dealt with under the rubric of "environmental problems". In the latter half of the 80s, global environmental issues began to emerge as a national concern occupying the minds of the people. It may be noted that within the private sector itself, these has been a corresponding change of behavior, shifting the emphasis from that of simply reacting and responding to government regulations to one of voluntary, self-governance and of contributing to the efforts of the society at large to improve the quality of the environment as a good corporate citizen.

A number of studies have been carried out on the past performance of Japanese companies in this area, mostly by government authorities and NGOs, but it seems that few studies have been conducted by the practitioners of corporate environmental management themselves, of their motivations and understanding

about environmental issues behind numerous managerial decisions they all ultimately had to make. The Environmental Governance Project of IGES therefore asked a number of business people with this experience to come together and to form a "Study Group on Business and Environmental Governance". The Group was formed in September 1998, and met regularly (twice a month) ever since to report on each other's experiences and discuss their findings. It has to be acknowledged here that, during the process, there would often be a heated debate on the meaning of "environmental governance", particularly for private firms, and as to whether any of them had a clear understanding of this concept when they were managing environmental affairs in their respective companies.

This report is an outcome of those studies and discussions. The Study Group plans to continue their study and consider ways and means of transferring their experience to their counterparts in other countries of Asia. It is hoped that this report will help deepen our understanding of the mindset as well as practices of private enterprises in Japan toward improved corporate environmental governance. We would all welcome any comments or criticism from the readers.

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1. Environmental Governance and the Role of Business

1.1 Introduction

Following the high growth of the post-war period, the Japanese economy experienced the effects of the oil crises, a period of stable growth and now is experiencing a sluggish period. The industrial sector is undergoing structural change to adjust to this situation, and environmental issues that began with pollution problems are now turning into urban environmental problems and global environment problems. In this paper the role of business in environmental governance during the different periods noted above will be considered.

For purpose of convenience, this paper has been divided into the following four periods:

First period: (1945-1969) High economic growth period

Second period: (1970-1979) Oil crises period

Third period: (1980-1989) Stabilized economic growth

Fourth period: (1990-present) Sluggish period

1.2 The response of business during the First Period (1945-1969)

(1) Characteristics of economic activity and environmental problems

With the goal of post-war recovery, Japanese industrial policy during this period aimed at high economic growth, making the heavy chemical industries play a central role for this object. The yearly growth rate exceeded 10% for almost twenty years (See Figure 1-1).

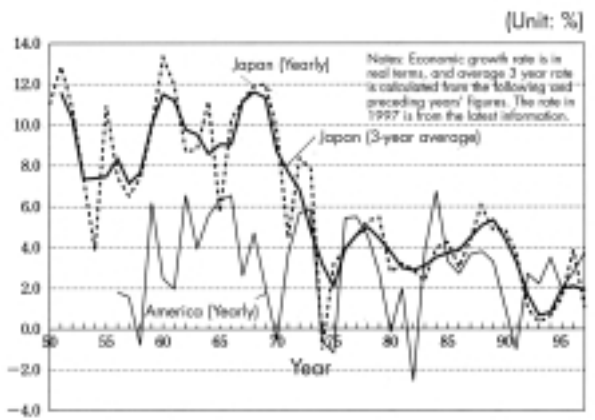

Figure 1-1 Macro-economic Growth Rate (GDP)
Source:"The Three Japanese Industrial Waves" (Itami Keisuke)

With regard to the location of industry, waterside industrial complexes, principally petrochemical, were developed nationwide and the industry was promoted with the characteristic that many factories concentrated in specific areas. During this period, the most predominant form of energy used

in Japan switched from coal to oil in the so-called energy revolution. Economic activity rapidly increased production levels, especially in the factories of the industrial complexes, and caused serious health damages in specific areas due to air and water pollution. It was during this period that the so-called four great environmental suits were brought (See Table 1-1). In Tokyo, the capital city of Japan, the citizens took actions for anti-pollution movement, and this fact was impressive for Japanese people at that time (e.g. the Paper manufacture drainage problem of 1958).

Trial	Sue Date	Judgment Date	Outline
Minamata Disease (Agano River Mercury Poisoning)	June 1967 (First case)	September 1971	Organic Mercury poisoning after ingestion of fish contaminated by water drainage containing organic mercury coming from a chemical firm
Yokkaichi Asthma	September 1967	July 1972	Asthma provoked by air contamination by exhausts from 6 petrochemicals firms
Itai-itai Disease (ouch-ouch disease)	March 1968 (First case)	June 1971 Appeal judgment in August 1972	Cadmium poisoning by ingestion of drinking water, agricultural product and fish contaminated by the discharge of cadmium by a mining firm
Kumamoto Minamata Diseas	June 1969	August 1973	Organic mercury poisoning after ingestion of fish contaminated by water drainage containing organic mercury that had been rejected by a chemical firm

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Table 1-1 The Four Major Pollution Lawsuits

The local governments were firstly pressed by the voice of local citizens and started taking actions. Pollution control ordinances were established successively in Tokyo (1949), Osaka (1950) and Kanagawa Prefecture (1951). The central government also started to establish measures with the two laws on water pollution control (1958), the Soot and Smoke Regulation Law (1962) and then the Basic Law for Environmental Pollution Control (1967). Also established at this time was the Factory Location Law (1959) which aimed at environmental preservation by securing a fixed proportion of greenery area in the areas where plants were built.

(2) The response of business to the environmental problem

During this period there was insufficient knowledge among enterprises concerning the prediction of the impact of concentrated industrial complexes, the pollutants emitted from the production process, their constituents, and impacts on the environment. It could be said that it was for this reason that the implementation of environmental measures was postponed and that the problems could not be solved easily. Nevertheless, while business deepened their awareness of air and water quality problems,

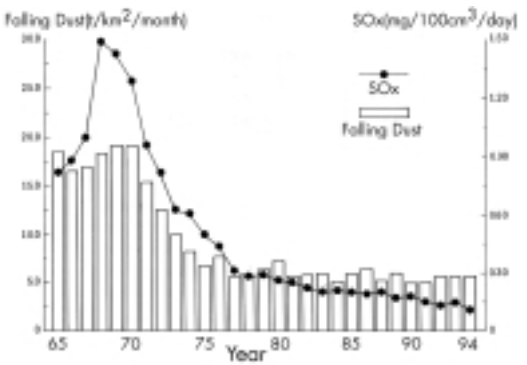

Figure 1-2 Changes in Annual Means of Falling Dust and SOx

Source: "Environment in Kita-Kyushu" (1994 Edition)

possible measures were started in cooperation with local governments. With regard to the air pollution such as black fumes and soot caused by the increasing use of coal and oil, it was citizen' action that raised the issue to the status of a social problem. As well, Soot and Smoke Regulation Law, and on the technical level, the fact that soot and dust collecting technologies were known, led to the comprehensive use of the soot and dust collecting facilities. The yearly results were outstanding (See Figure 1-2).

With regard to water pollution, in order to preserve the quality of the public water areas and comply with the plant water drainage regulations, neutralization tanks, precipitation tanks and active polluted water processing plants began to be introduced. Again, the results were remarkable and the water quality improved rapidly (See Figure 1-3). Moreover, each industrial sector cooperated with the administration. A "Technical Book on Fumes and Drainage Water Processes" was produced and efforts were made to diffuse techniques throughout all industries. Rising costs generated by these investments were absorbed by the extension of production scale generated by economic growth.

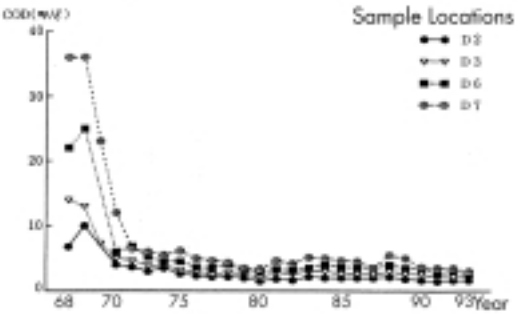

Figure 1-3 Changes in Annual Means of COD in Sea Area (Dokai Bay)

Source:"Environment in Kita-Kyushu" (1994 Edition)

1.3 The response of business during the Second Period (1970-1979)

(1) Characteristics of economic activity and environmental problems

In the 1970s, the standard of living of the Japanese people rose dramatically as cars and household electrical appliances became commonplace. In this context, the rise of oil prices caused by the first and second oil crises of 1973 and 1979 had a great influence on the Japanese economy. The slowdown of the growth rate influenced modifications of the structure of Japanese industry. Industry, especially energy intensive sectors, met with a cost escalation caused by the soaring price of energy, in particular electric power. This had a great influence on its international competitiveness.

There were actions to solve environmental problems, including air and water pollution from point sources that had begun in the 1960s. But the air pollution in urban area resulting from the motorization was becoming serious.

In response, the government established fourteen laws related to pollution during the Diet Sessions on the Environment (1970) including: the Water Pollution

Control Law, the Air Pollution Control Law, and the Waste Disposal and Public Cleaning Law. The Environment Agency was founded in 1971 and the Pollution-Related Health Damage Compensation Law was enacted in 1973, ensuring the assessment and the compensation of damage to health victims. Regulations on SOx and NOx were successively reinforced, and automobile exhaust gas regulations were come into effect.

(2) The response of business to the environmental problem

During this period, awareness about air pollution caused by soot, dust and SOx, and awareness about water pollution problems progressed within business. Large investment was drastically made to solve problems in a short time. Most of this investment was made in four basic material industries; steels, power generations, chemicals and oils. To combat air pollution caused by increasing oil use, measures to control point sources pollution were promoted, for example: the removal of sulfur in heavy oil (heavy oil desulfurization) and the utilization of flue gas desulfurization facilities as well as soot and dust eliminating and collecting facilities. As for cars and other mobile sources of pollution, the phase-out of lead in gasoline was at first promoted.

Moreover, in order to adopt the same level of regulation enforced by the Muskie Law in the United States, the so-called 1978 law was established in Japan. With the large scale decreases (1/10 of the rate until then for CO and HC, and at 0.25 g/km which was a level without equivalent in the world for NOx), the regulations were seemed to be the most severe in the world and impossible to be achieved. But Japanese automobile makers mobilized their R&D staffs to develop technologies, and as a result they met the regulations. This fact made the automobile industries in the rest of the world surprised.

With regard to water pollution, the mercury contamination of seawaters became a social problem (Minamata Disease). As a result, the sodium hydroxide production process using mercury had to be totally changed in favor of a new process without its use, as mandated by the government in 1973. For this reason, the industry undertook to develop new processes and managed to convert totally by achieving an ion exchange membrane method that gave high quality and energy saving products. This method was highly valued in Europe and in the United States.

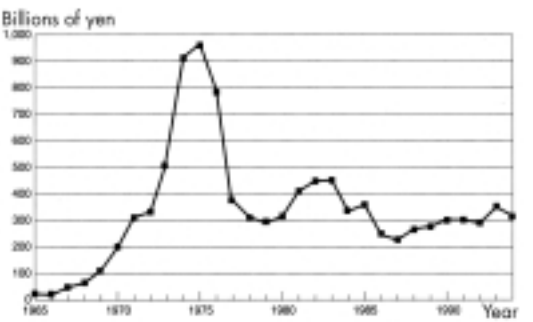

Figure 1-4 Trends in Investment into Pollution Prevention Equipment in Japan

Source: "Eco-Asia Long Term Perspective Report "(Environment Agency, 1997)

Moreover, at the beginning of the 1970s, as measures against dust and for the achievement of the Factory Location Law, the scientific ecological approach, which was debated at that time, was introduced. In addition, business undertook activities to increase greenery around their plants in the long term even appeared. Today, there are thick woods around the factories and power plants of those enterprises (See Figure 1-4).

In the background of these investments, there was also the deep concern of public opinion about environmental issues and the response to environmental regulations. Further, it can be said that in the companies, awareness became stronger that building a good relationship with the inhabitants of their location areas was a basis for their own existence. In other words, business were conscious that they couldn't exist in an area without solving environmental problems there.

It was for this reason that they developed technologies and made investments in equipment to meet the most stringent regulations in the world. However, there were also some regulations that were technically impossible to be achieved, for example, those for NOx. Reviews of environmental criteria were made following assertions made by industry that some concerns were unrealistic and could not be justified, even from an epidemiological point of view (in 1973).

To achieve the results mentioned above, technical developments and investment in equipment in many enterprises had to be carried out without any obstacles. For this reason, the government took many supportive measures for technological development, particularly on the fiscal and financial level, at the request of industry. The impact of such measures in technical development and investment in equipment cannot be overlooked. As a result, SOx and NOx levels became the lowest in the world, even today. On the other hand, with regard to energy, many changes from oil dependence were generated by the first oil crisis. In electric power generations, there were conversions to nuclear power, liquefied natural gas and coal. In addition, in response to the increasing costs generated by the increasing oil prices, energy saving measures have been rapidly promoted. The second oil crisis in 1979 had a strong influence on Japanese industry. Especially it was a matter of vital importance for the energy intensive industries.

Figure 1-5 Car Production in USA, Japan and Germany (Unit: 10,000 cars)
Source: "The Three Japanese Industrial Waves" (Itami Keisuke)

1.4 The response of business during the Third Period (1980-1989)

(1) Characteristics of economic activity and of environmental problems

Industry managed to cope with the influence of the second oil crisis with the aid of energy saving measures among others. Nevertheless, the core of the industrial structure clearly changed from basic materials industries to electric, electronic, production and mechanic assembling industries. In the 1980s, as the amount of automobile product in Japan became top in the world, the position of Japanese industry in the world rose (See Figure 1-5). For this reason, trade frictions arose between the United States and Japan, concerning for example cars, semi-conductors and steels (See Figure 1-6). Then there is a transition to the 'bubble economy', as the value of yen rose. The movement of production plants from Japan, where the strong yen made costs relatively high, to overseas locations, especially in Asia, occurred suddenly. This relocation made the consideration of environmental issues in Asia inevitable.

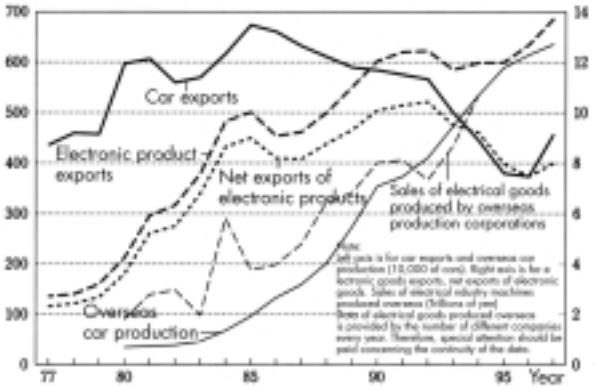

Figure 1-6 Exports and Oversea Production of the Automobiles and Electronic Products

Source:"The Three Japanese Industrial Waves" (Itami Keisuke)

Further, concerning chemical substances, the "Law Concerning the Screening of Chemical Substances and Fabrication Regulations" (1983) was enacted, aiming at a new regulation of the product and of the management of chemical substances that have the property of accumulating. This change came as a result of environmental destruction that occurred in the 1970s in every country and also as a result of the PCB Mixed Rice Bran Oil Affair. Previous patterns of industrial pollution had been dealt with successfully by reinforcing regulation and further environmental measures. However, the so-called urban life-related environmental problems arose, caused by the high density of land use. This utilization of land finds its origin in the urbanization and in the consumption generated by the increase of income. The waste disposal problem, toxic chemical substances and the destruction of the ecosystem are also among these problems.

With the respects to the background, the changes in life style such as the spreading of electrical home appliances, cars and food packaging should be pointed out. The depletion of the ozone layer and global warming problem become significant issues so that they have been discussed in the international political arena.

(2) The response of enterprise to environmental problems

The industries was damaged by a considerable cost increase resulting from the sudden rise in oil prices following the second oil crisis, and the jump in general price level caused by rising electricity costs which accompanied the shock (the impact was most severe in Japan, a country highly dependant on overseas energy). For industry - especially energy intensive industry- the ability to reduce costs by carrying out energy saving processes to maintain international competitiveness was crucial (See Figure 1-7).

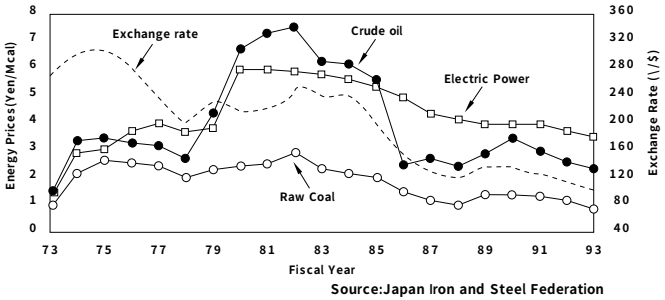

Figure 1-7 Trends in Primary Energy Price

Every enterprise worked very hard to introduce innovative technologies to save energy. By this time, the technologies introduced were quite advanced even at the international level, and today there are still many technologies that are used only in Japanese enterprises. The fact is that energy saving technologies also contributed to an increase in productivity and significantly reducing costs, thereby creating a further source of competitiveness (See Figure 1-8).

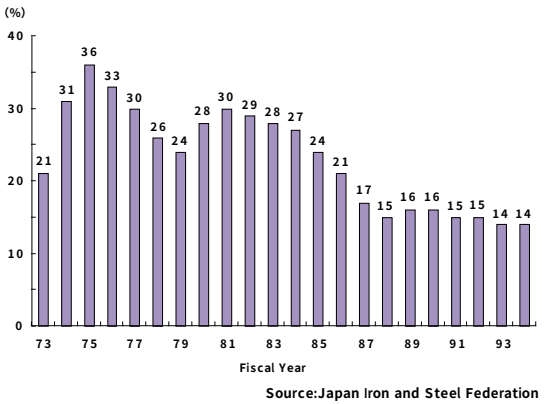

Figure 1-8 Trends in Energy Cost Percentages

Nevertheless, the rise of production costs, the leveling-off of domestic demand and the relative loss of international competitiveness resulted in slowdown of economic growth rate. The industrial structure moved from a basic materials industry that was energy intensive to a processing / assembly, high value-added type industry that was less energy consuming and that put very low level of burden on the environment. At this time, the aluminum refining industry that had a 10% share of world production has disappeared from Japan, due to the sudden rise of

power generation costs.

Also, there were no new locations for the material industries which lost their relative international competitiveness due to environmental investments made in the 1970s and energy saving investments in the 1980s. Electric power generations also moved from oil dependence to a best mix policy of nuclear power, liquefied natural gas and coal.

However, on the environmental level, the result of energy conservation was a diminution of the environmental burden of SOx and NOx due to the low levels of energy consumption. As a result, public recoginition that the environment problem had been resolved to some degree spread throughout Japan. Also, asserting that the increase of compensation payments to health damages as determined by a Pollution-Related Health Damage Compensation Law was a problem, even after achieving the best environment level in the world through massive investment, industry successfully lifted the burden of compensating newly certified health damage (1988).

From the mid 1980s, industry again suffered a decline in competitiveness due to the sudden rise in the exchange rate of the yen. In order to lower the production costs, the firms began the activities for the procurement of raw materials, machines, parts and foods through imports and the shift of production overseas. Consequently, the destruction of environment (such as tropical forests, farming etc.) resulting from imports and the environmental damage caused by overseas relocation became the focus of public attention. Through their efforts to cope with such problems, enterprises had the occasion to make contact with NGOs, leading to the opening of proper discussions and to the deepening of their knowledge of NGOs.

1.5 The response of private enterprise during the Fourth Period (1990 to present)

(1) Characteristics of economic activity and environmental problems

With the collapse of the cold war structure, the US style of economic liberalism became the global standard and international competition became more severe for enterprises. The development of the information and telecommunication industry and the globalization of enterprise activities further promoted this trend. It was in this context that economic growth slowdown caused by the burst of the bubble economy happened. The corporate system which has been functioning well until now cannot keep up with the new world trends and has been forced to undergo a reevaluation.

The environmental problem is broadening in termas of time and space and is becoming complex. The government revised the Basic Law for Environmental Pollution Control to the Basic Environment Law, and began to look at it from a new point of view (1993).

Environmental problems relating to urbanization and life-style continue to be serious, and restrictive factors on economic activity along with the

determination of who will bear its costs are issues that have recently appeared.

Global environment problems such as the depletion of the ozone layer, global warming, chemical substances, toxic wastes, tropical forests and acid rain are common international problems that must be discussed in the international political arena. The fact that the Framework Convention on Climate Change has been established is a symbolic achievement. In the not so distant future, determining how to cope with phenomenon that have not yet been experienced will become a significant issue.

(2) The response of enterprise to environmental problems

With respect to the problem of the depletion of the ozone layer caused by use of Chlorofluorocarbons(CFCs) that appeared in the 1980s, the relation of cause and effect is well known. In the 1990s the production and use of CFCs had been reduced or banned, and the development of substitutes has progressed rapidly. It was the first time that a global environmental problem was solved by international efforts.

Further, the international chemical industry has begun under its own responsibility to develop "Responsible Care" (RC) activities that aim at the general management of chemical substances. Enterprises pay voluntarily attention to the environment and safety throughout the life cycle of the chemical substance, and this future performance should be paid attention as new activities with information disclosure.

Also, from sometime around the Rio Summit (1992), declarations and discussions organized by world businessmen came on the scene, due to the awareness of world industries concerning their duty to undertake global environmental issues as a common problem. Persons in the top management from a number of big Japanese firms also joined in them. The International Camber of Commerce (ICC) that announced the “The Business Charter for Sustainable Development - Principles for Environmental Management” (April 1991) and which also made an appeal to enterprises all around the world to gain support for the charter is typical of this trend. In addition, the “Business Commission on Sustainable Development” (BCSD) that gathers businessmen from around the world and that made a declaration for sustainable development can be cited.

In Japan also, the Federation of Economic Organizations (Keidanren) has published a “Global Environment Charter” (April 1991) that features articles concerning directions that must be followed by enterprises in order to preserve the environment, or concerning environment preservation related to overseas business. The “Keidanren Nature Conservation Fund” was established (April 1992), and support for NGO activities began. Further, after the agreement with the Framework Convention on Climate Change, the “Keidanren Appeal on Environment-Declaration on Voluntary Action of Japanese Industry Directed at Conservation of Global Environment in 21st Century” was made in July 1996. It asked all enterprises to make plans and set objectives in order to act concretely. It made an appeal for the work necessary to resolve problems through voluntary

programs, and not by regulations. With these steps top Japanese management have rapidly deepened their awareness of the issues and individuals enterprise have begun to wrestle with them in a concrete fashion.

Concerning the method of dealing with such problems, aiming for a global standard has become a main objective. The ISO 14000 series, a method of promoting voluntary actions (global warming problem, chemical substances), and information disclosure (environmental report, environmental accounting, PRTR), has brought the beginning of active work in each of these domains. In particular, enterprises that develop global business take actions in every situation with the awareness that it is necessary as a business tool. As a result, all enterprises have been made conscious of environmental issues. Concerning the urbanization and life style-related environment problem, enterprises are now coping with the scientific knowledge necessary to resolve it and are working rapidly to develop new processes, substitutes and recycling technologies. In these fields, since such problems concern the daily life of many people, some enterprises are now trying to resolve them in cooperation with NGOs, that have appeared as a new manifestation of citizens action. Among globally powerful NGOs, the development of consumer boycott activities and the judging of the activities of enterprises from an environmental point of view have come on the scene. Enterprises can no longer ignore such movements. Every enterprise is now taking environmental issues as one of the conditions for business. In every respect, enterprises are now taking the environment into consideration, making objectives out of its relationship to the environment, for example in business philosophy, enterprise image improvement or marketing method. At an increasing rate, enterprises are now taking into consideration the several concepts of production such as, not only the efficiency of production, but also the durability of products, ease of recycling, the absence of toxic substances, functionality and energy saving characteristics. Also in the purchasing of material and parts, low level of burden on the environment is now being considered.

1.6 Conclusion

With regard to environmental issues up to the present, Japanese private enterprises have played a certain role in environmental governance while making lots of efforts. Everyone is now concerned about environmental issues and their resolution. Efforts to find original ideas that go beyond the framework that has been considered valid to the present day are becoming necessary. As for private enterprises, they are being asked to play a central role now more than ever. What is the right level of awareness for the problems that are temporally and spatially critical? How should they be worked out? These are very difficult challenges as they are without precedent. Actions have just begun. Businessmen think about how the production system of the 21st century will be built, but this is a problem of corporate philosophy as well as of environmental ethics. Enterprises, while continuing to cope with existing environmental issues, are pressed to respond to these new challenges.

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2. Environmental Control and Steel Industry
- Air Quality-

2.1 Introduction

Since the 1960s the Japanese economy has made rapid progress, and together with the rapid expansion of this economic activity, environmental problems of air and water pollution and other forms of pollution have occurred. Faced with this problem, the central government, regional governments and industrial enterprises have cooperated with each other and have fulfilled theri own function. They have made the greatest possible effort to eliminate pollution and to achieve environmental standards, and they have gained substantial results. The various measures that have been implemented by industry, and especially by the steel industry, directed at improving the air quality and the systems and structures that form the background to this are explained here. In particular the history and significance of the pollution prevention agreement which is a system unique to Japan, are explained in greater detail. Reference is also made to environmental technology transfer in the future.

2.2 The position of the steel industry in Japan

(1) Quantitative changes in Japanese steel production

Quantitative changes in the production of steel in Japan have followed the same course as the development of the Japanese economy, showing a rapid expansion of production from the first part of the 1960s (See Figure 2-1). As a result, at that time the steel industry became one of the representative pollution producing types of industry. In that sense it is not too much to say that telling the story of the steel industry's environmental policy is the same as following the history of environmental policy.

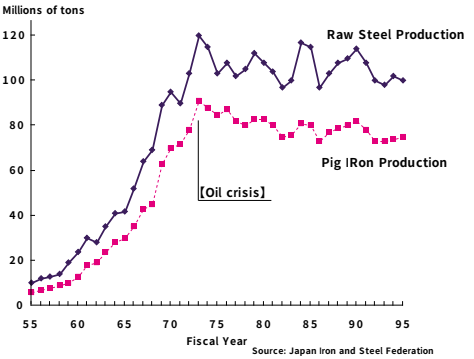
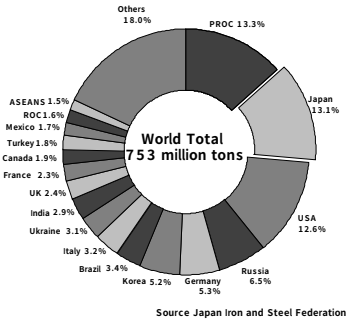


Figure 2-1 Quantitative Changes in Japanese Steel Production



<Reference> The Ratio of Raw Steel Produced by Various Countries

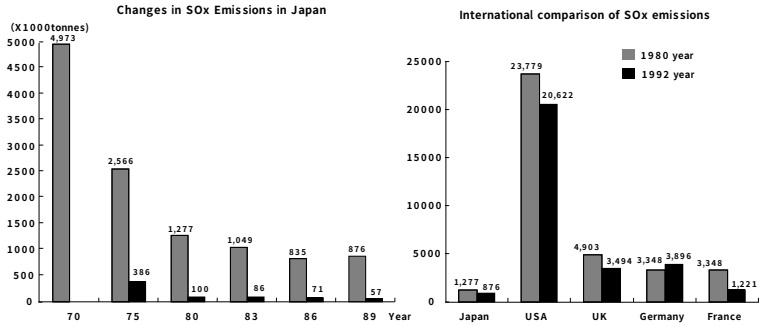


Figure 2-2 Changes in SOx Emissions in Japan and International Comparison of SOx Emissions

(2) Air environmental load by the steel industry

Figure 2-2 shows the amount of SOx discharge for Japan and the quantity of discharge from the steel industry. The amount of SOx discharged from the steel industry declines almost in the same proportion as the general Japanese discharge of SOx declines. Compared with the decade of the 1970s the discharge has declined to better than 10% at the present. It can also be seen how small the Japanese discharge of SOx is compared with foreign countries.

2.3 Changes in the concentrations of SOx, NOx, and SPM in Japan

Figure 2-3 shows changes in the concentrations of SOx, NOx and SPM in Japan. The SOx level of 0.057ppm in 1965 has

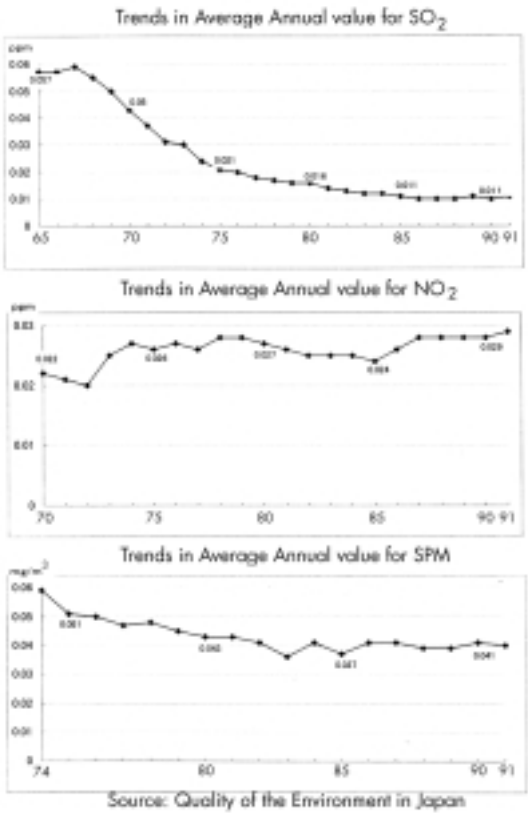


Figure2-3 Trends in Average Annual value for SO_2, NO_2 and SPM in Japan

fallen to a level of 0.01ppm today, and at the almost all monitoring stations the environmental quality standards for SOx (daily average values shall not exceed 0.04ppm) have been achieved. There has not been a great change in NOx during the last 30 years. But when it is considered that from the decade beginning in the mid-60s the number of motoring vehicles owned increased by about four times, the effort made to reduce NOx emission from point sources can be appreciated. The environmental quality standards for NOx (daily average of hourly values shall be within or less than a range of 0.04ppm to 0.06ppm) is being met as an average of all monitoring stations. It is, however, not satisfactory that the attainment rates at the roadside monitoring stations are only about 65%. In addition, 60% of current NOx emissions are from non-point sources. While the average measurement value of SPM in all monitoring stations is achieving a rather lower value than the environmental quality standards (highest annual daily average values shall not exceed 0.10mg/m^3), satisfaction cannot be derived from the fact that the attainment rates at the general and roadside air pollution monitoring stations are 70% and 40%, respectively.

2.4 Efforts being made by the steel industry to reduce the burden on the environment

From the changes in the concentrations of SOx and NOx in Japan, the efforts made to reduce discharges from industry, particularly from point sources, can be appreciated. The various policies directed at reducing the environmental load by the steel industry are referred to below.

(1) Environmental management policy (The example of company A)

Table 2-1 shows the environment policy of company A [(1)]. Efforts to improve the environment are established as one of the principles of enterprise management. "Reduction of the burden on the environment at all levels of company activity" in particular has been the keynote of basic policy since the decade of the 1970s.

Table 2-1 The Environment Policy of Company A (1998 edition)

1998Edition

Business is carried out based on the environmental policy outlined below.
Company A is committed to the formation of a society with sustainable development that places a small load on the environment. It will carry out its business activity contributing to the objectives of, "Building the type of society that protects the environment" and "World wide environmental protection"

[Basic policy]

1. Contributing to building the type of society that protects the environment.
   Up till now the company has been observing the principal of building the type of society that protects the environment, and has been engaged in an environmental policy.
   The company will continue to carry on business activity from a viewpoint of worldwide environmental protection in the following ways: keeping in harmony with the ecological system, protecting and improving the living environment, stopping environmental pollution before it occurs, and stopping global warming and destruction of the ozone layer.
   In these ways the company will contribute to building the type of society that protects the environment
2. Decreasing the load on the environment at each step of business activity.
   The company will promote business activities with awareness of reducing the environmental load, and to this end will cooperate with customers and other enterprises at all stages from procuring raw materials, machinery and supplies, through the transport, use and the eventual disposal of products.
3. Engaging in worldwide environmental protection from an international standpoint.
   Company A will put to use the experience that it has cultivated till now in international technical cooperation, beginning with the construction of steel plants, and it will contribute to worldwide environmental protection by transferring to foreign countries technology related to environmental protection, energy reduction and reduction of resource use.
   Also company A, in carrying out its own overseas activities, will take into consideration the natural and social environment of the host country and its policy achievements in Japan and strive to protect the environment.

[Concrete policy]

* Environmental protection at all steps of business activity
* Energy saving
* Reducing resource use, and using resources better through scrap recycling and through using by-products as resources.
* Development of materials, plants, and systems which contribute to environmental protection and energy and resource saving.
* Logistics policy
* Policies for toxic substances in the air
* Innovative technological development
* Engaging in environmental protection from an international viewpoint in international technical cooperation and overseas business activities.
* Creation of a rich environment through promoting greenery and regional environment improvement
* Promotion of environmental education and public information
* Establishment of environmental management systems and introduction of environmental audit systems

(2) Changes in SOx and NOx emission

Figure 2-4 shows the change in the volume of discharge of SOx and NOx in company A. In regard to SOx, over 25 years there was a

reduction of discharge of about 85% carried out. Examples of concrete policies are the reduction of the amount of sulfur in raw materials and fuel, a reduction in the amount of fuel burnt (energy reduction policies), installation of equipment for the desulfurization of flue gases, and others. A reduction of approximately 40% of NOx has also been achieved. This is mainly based on the improvement of devices for the combustion of fuel, a reduction in the nitrogen element in fuel, a policy of reducing energy use, and the installation of devices for denitrification of flue gases and other policies.

(3) Environmental investments by the steel industry

Figure 2-5 shows environment investments in the steel industry. Between 1971 and 1994 approximately 1,500 billion yen was invested in environmental protection. Expressed in terms of different environmental media, the investments in air quality improvement accounted for 60%, followed by water quality and waste management. In the process of implementing these policies, going on from the cooperation of environment plant makers, there were R&D of environmental technology suitable for the plants in steel manufacture, and daily improvements applied to equipment and other measures. In applying these, technology groups rich in experience fulfilled a large role. One example is shown in Figure 2-6. Equipment for the desulfurization of flue gases at first generally used the lime gypsum method, but today the more compact and cheaper magnesium hydroxide method is widespread [(2)].

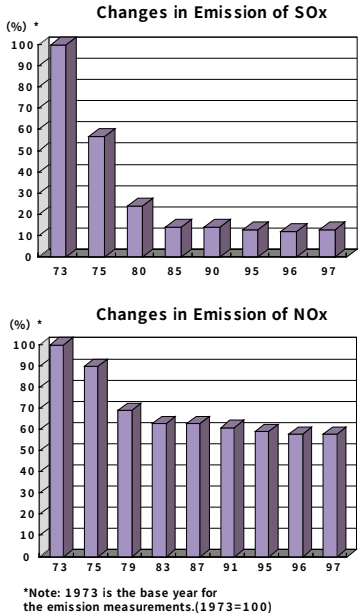


Figure2-4 Achievements in Pollution Reduction by Company A

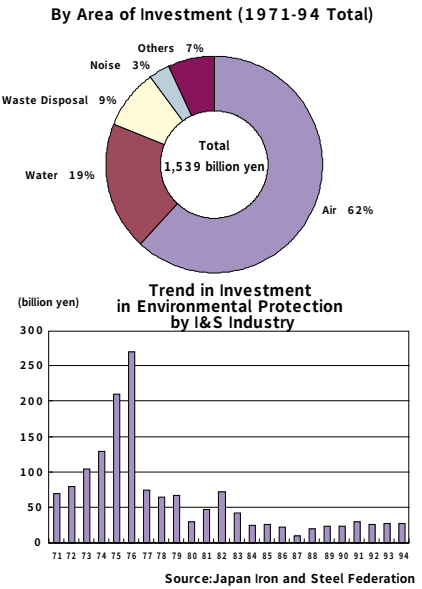


Figure2-5 Investment in Environmental Protection by I&S Industry

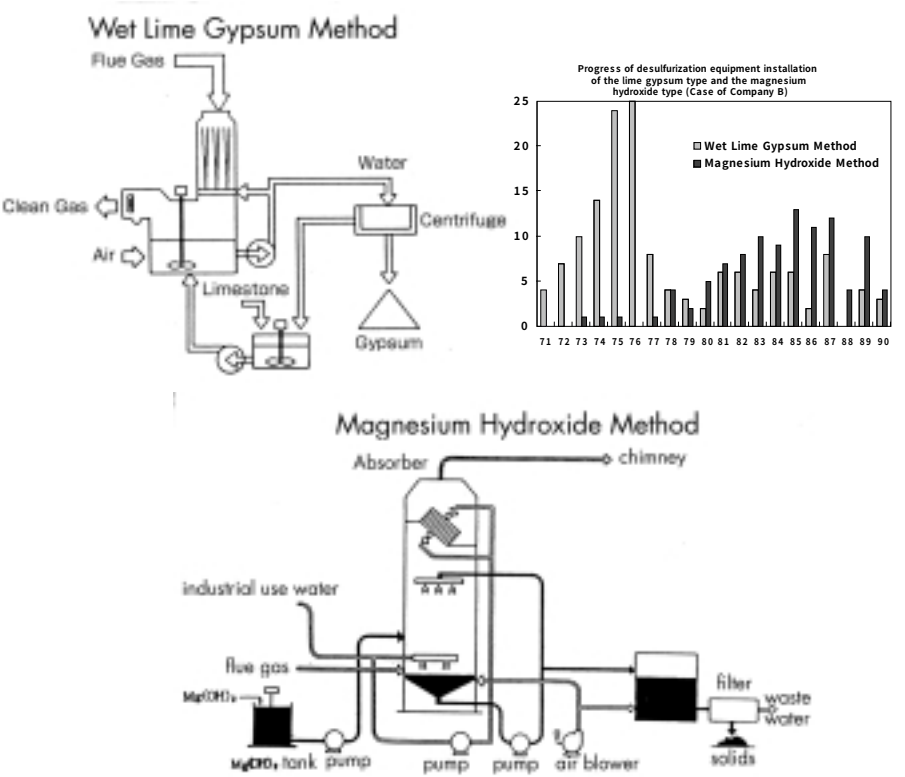


Figure2-6 Smoke Desulfurization Technologies

(4) Energy saving policy and its effects

In improving air quality the removal of harmful substances in fuel or flue gas is a direct method. Compared with this the reduction of fuel combustion, however, this method is the promotion of a energy reduction, holds a position as a more basic policy. That is, the reduction in the amount of fuel burnt reduces the discharge of harmful substances and reduces the general amount of gas discharged, and it makes possible more compact equipment for dealing with flue gas and high efficiency in

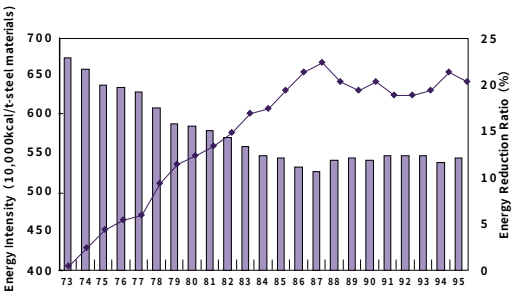


Figure2-7 Progress of Energy Intensity and Changes in Energy Reduction Ratio (Case of Company A)

installing and running.

1) Energy base units and energy reduction achievements

Figure 2-7 shows the achievements in energy base units for company A. It can be seen that in the 20 years to the present there has been a reduction of approximately 20% achieved. The steel industry from 1970 has invested a yearly average of better than 100 billion yen in energy reduction policy, and made great efforts in operation improvement.

2) The state of the installation of energy reduction facilities in various countries and energy base units compared.

Table 2-2 shows the position for the installation of energy reduction facilities in various countries. The high ratio of the installation of equipment for energy reduction in Japan can be seen. The fact that these energy reduction policies function effectively from the point of view of environmental protection has been previously mentioned. Additionally, because of the high price of energy in Japan, these policies also had a considerable effect on the cost reduction. In Figure 2-8 the comparison of various countries' energy base units are shown. From the point of view of energy-saving equipment ratio, operation technology and other measures it is apparent that Japan has reached a level of excellence.

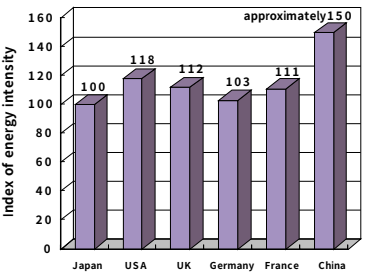
Table 2-2. The Installation of Facilities to Reduce Energy Use in Various Countries

(equipment ratio: %)

	Dry coke fire extinguishing device	Electric generating device at the top of blast furnace	Continuous casting device	Device for gas recovery from revolving furnace
JAPAN	85	97	96	100
CHINA	11	2	35	3
KOREA	50	100	98	85
U.S.A.	0	2	86	11
U.K.	0	0	86	18
GERMANY	33	24	94	0

1994 Operation basis
Source: Japan Iron and Steel Federation

Note:
1. Dry coke fire extinguishing device is the equipment that makes it possible to recover the heat in extinguishing burnt coke with the inert gas extinguishing method, which is substituted for the previous water extinguishing method.
2. Electric generating device at the top of blast furnace is the electric power generation equipment using the pressure at the top of blast furnace.
3. Continuous casting device is the equipment for making slabs directly from molten steel. As well as shortening the process this makes possible a large saving in energy.
4. Device for gas recovery from revolving furnace is the equipment to recover fuel gas produced from a revolving furnace.



Source: Japan Iron and Steel Federation

Figure2-8 International Comparison of Energy Intensity of Iron and Steel Production

2.5 Systems and plans for improving the air quality

(1) The method used in pollution policy

In the previous section it was related how industrial pollution produced under high economic growth was surmounted. Also aware of the increasing citizen environment improvement movements, the various steps which the industrial world took independently, to come to terms with this problem, and the effectiveness of these steps, were related. As distinct from these, as a background and also as a motive for these industrial policies, various national and local government environmental policies can be considered. In Table 2-3 the methods

used in pollution control policy are shown. The Air Pollution Control Law of 1968 and the amended Air Pollution Control Law of 1970 with the phased completion of strengthening clearly functioned effectively at the level of regulations. In addition to this, the agreements based on the consent of the relevant parties such as pollution prevention agreements, the pollution prevention and management systems and financial assistance system and other measures can be pointed to, but we will try to verify these things by concrete examples.

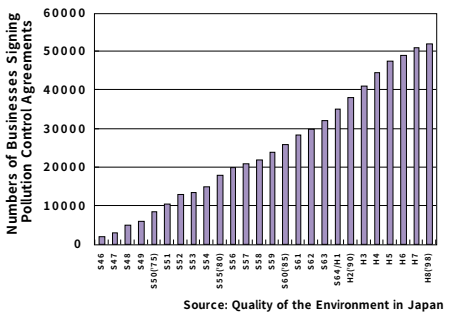
Table 2-3 The Method Used in Pollution Policy

Type of Method	Actual example of the method
1. Standard, regulation.	* Placing weight on the operator's knowledge (emphasizing the ac tual feasibility) * Strengthening regulations and standards incrementally * The method of regulation using pollution prevention agreements with the consent of the relevant people
2. Introducing plan response	* Pollution prevention program (Key measures for designated areas) * Urban and other plans giving area designations
3. Practitioner development. (Education, Personnel training)	* Pollution prevention managers system * Pollution training system and organization * Guideline creation and explanation training system * Environmental education
4. Observance and guidance	* Preparation of monitoring system and on-site inspection with compulsory submission of data * Pollution prevention agreements incorporating an inspection and guidance system
5. Financial assistance	* Tax measures (Special depreciation and tax rebates) * Soft loan and mortgage guarantee * Environmental Pollution Control Service Corporation
6. Technical support and development	* Cooperative R&D and R&D subsidies * Technical guidance and support * Development of pollution control industry (Increase in the number of specialists)
7. Public investments	* Drainage work, industrial water work, water piping work * Waste disposal work * Developing cooperative businesses, jointly run facilities, moving business, green town and green area business
8. Damage compensation system	* Environmental Dispute Coordination Commission System * System for Compensation and Prevention of Pollution-Related Health Damage * Law Concerning Businesses' Bearing of the Cost of Public Pollution Control Works

Source: Morishima. 'The experience of pollution policy in Japan'

(2) The function fulfilled by pollution prevention agreements

The pollution prevention agreements are defined as being based on mutual agreement between local government and industrialists concerning measures that should be taken by the industrialist to prevent pollution generated by industrial activity or contamination of the environment. Memos exchanged in March 1952, regarding prevention of pollution, between Shimane Prefecture and the Sanyo Pulp Goutsu factory and the Daiwa Spinning Masuda factory are said to be the origin of the pollution prevention agreements. Later the agreement concluded in December 1964 between Yokohama City and the Electric Power Development Company Ltd. and the Tokyo Electric Power Company Ltd., who planned to go into the Negishi Marine Factory Zone, is thought to be the beginning of the main line pollution prevention agreements [3]. In Figure 2-9 the changes in the number of pollution prevention agreements to the present is shown by cumulative totals. It can be seen that the number of agreements has been steadily increasing. The contents of an agreement is that the industrialist promises to devise steps to stop pollution. However the level of environmental targets, the contents of the policy and the period within



Source: Quality of the Environment in Japan

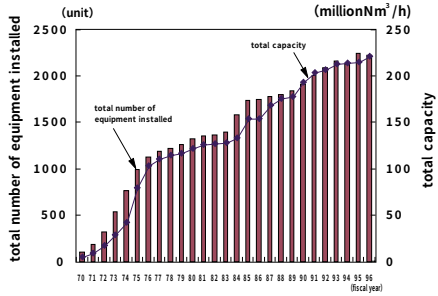
Figure2-9 Changes in Numbers of Businesses Signing Pollution Control Agreements

Table 2-4 The Actual Situation and Evaluation of Pollution Prevention Agreements (1) Examples Actually Concluded (Company A)

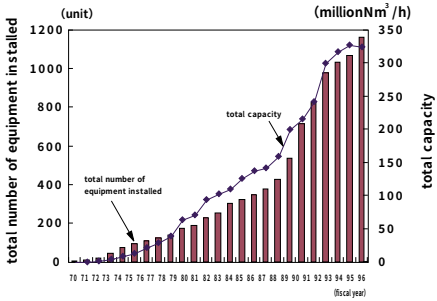
"(When the standards are not set by local ordinances, the values set by natioal law are entered.)"

Party concluding agreements	Name of agreement	Facility name	Regulation								Total amount of NOx emissions / Total amount of SOx emissions
			NOx concentration standard(ppm)				Soot and dust(mg/Nm^3)				
			Law	Local ordinance	Agreement	Peformance	Law	Local ordinance	Agreement	Peformance	
"Enterprise site A←→ Prefecture α, City X"	Pollution prevention agreement document (concluded in June 5 1970)	Facility-a	260	260	165	162	200	200	150	20	
		Facility-b	200	200	140	100	200	200	100	4	Regulated by ambient standards
"Enterprise site B←→ Prefecture β, City X, City Y, City Z"		Facility-c	250	250	250	85	150	150	150	30	
	"Agreement document relating to pollution preventioin (concluded in March 31 1974, the detailed agreement concluded in December 9 1975)	Facility-a	260	260	260	250	200	200	80	40	
		Facility-b	200	200	200	130	200	200	50	4	Regulated by ambient standards
		Facility-c	250	250	250	100	150	150	50	7	

which they will be carried out are set up through agreement between the enterprise and local government, and the agreement draws upon the independent efforts of the enterprise to respond. It is said to be one of the uniquely Japanese methods of environmental governance. As of today the contents of the agreements are being respected, and they show great effectiveness in improving the environment.



Note: Figures are as of 1 January of each year up to the fiscal year 1982, and as of 31 March of each year after the fiscal year 1983.
Source: Environmental Agency



Note: Figures are as of 1 January of each year up to the fiscal year 1982, and as of 31 March of each year after the fiscal year 1983.
Source: Environmental Agency

Figure2-10 The Actual Situation and Evaluation of Pollution Prevention Agreements- Progress of Installation of Stack Smoke Desulfurizers/ Smoke Denitrification Equipment by Fiscal Year

(3) The actual results and evaluation of pollution prevention agreements

1) An example of a pollution prevention agreement that has been concluded.

Table 2-4 shows an example of a contract. Generally, there are many pollution prevention agreements that incorporate standards and methods that are more demanding than the laws and regulations. The pollution protection agreements, depending on whether they accept the coercive power of the law or not, are largely divided between the standpoint that they are gentlemen's agreements, and the standpoint that they are interpreted as a contract. But the point of view that they are to some extent contracts that have coercive power is becoming general [(4)], and actually the agreements contents are being observed.

2) Year by year situations in regards to setting up facilities for desulfurization and denitrification from flue gas.

Figure 2-10 shows the situation in regards to setting up facilities for removing sulfur from flue gas and removing nitrogen from flue gas. The facilities are not only set up to fulfil pollution prevention agreements, but there is no doubt that agreements bear great weight as added incentive. Further, a sharp turning point became apparent about 1975, for facilities to remove sulfur from flue gas, and this seems to have been because of the implementation of the Pollution-Related Health Damage Compensation Law of 1974.

Figure2-11 The Role of the Pollution Prevention Control Systems

(4) The role played by the pollution prevention manager system

In terms of the Law Concerning Pollution Prevention Organizations in Specified Factories come into effect in 1971, pollution prevention managers were put in place in factories and places of business. This heightened the potential for environmental management and technology, and it also greatly contributed to the smooth communication between factories, local government and regional citizens and others. Figure 2-11 shows the change in the number of pollution prevention managers by accumulated totals.

(5) The functions fulfilled by the System for Compensation and Prevention of Pollution-Related Health Damage

Based on Polluter Pays Principle, the Pollution-Related Health Damage Compensation Law was put into effect in 1974. As a

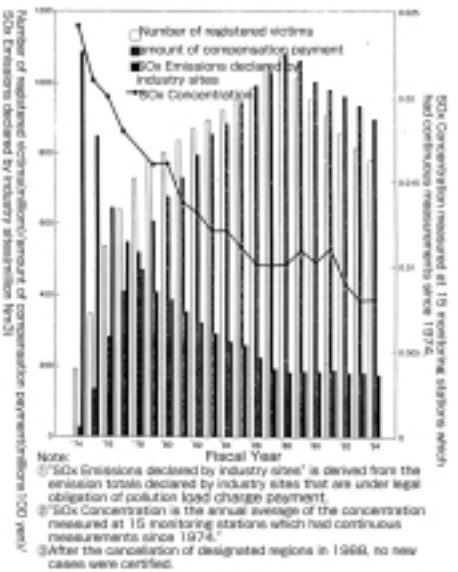


Figure2-12 Trends in Average Annual Value for SOx and Changes in Compensation Payment to Pollution Victims Based on Pollution Control Laws

result policy to reduce discharge of SOx was speeded up at a stroke and the density of SOx in the atmosphere was greatly improved. The change at that time is shown in Figure 2-12 (5). Further in 1988 accepting that the SOx concentration level had greatly improved, the establishment of designated environment pollution areas was lifted, and till the present no designation of new victims has taken place.

2.6 Concerning environmental technology transfer

We think it is our mission to transfer, technology and systems developed while stopping Japanese pollution. Let's specifically follow the transfer of environmental technology to China.

(1) Air pollution in representative steel manufacturing sites in Japan and China compared

In Table 2-5 the discharge level of air pollutants at representative Chinese and Japanese steel manufacturing sites and also the air qualities are compared. As shown in Figure 2-8 the energy base unit in China is high, environment policies are insufficient, and for other reasons it can be appreciated that the load borne by the environment is great at Chinese steel manufacturing sites. This fact is recognized as a major problem within China itself, and various policies are being studied and implemented.

Table2-5 Comparison of the Air Quality in Representative Chinese and Japanese Steel Manufacturing Sites

		China	Japan
Sulfur Dioxide	SO_2 emissions per 1t of crude steel	25kg/t crude steel (3289) *1	0.76 kg/t crude steel (100)
	The concentration near manufacturing sites (annual average)	0.184mg/N^3 (307)	0.06mg/Nm^3 (100)
Soot and dust	Quantity of dust precipitated (annual average)	63.5t/month・km^2 (907)	7.0t/month・km^2 (100)
	The concentration near manufacturing sites (Suspended particulate matter, annual average)	0.588mg/Nm^{3} *2 (1470)	0.04mg/Nm^{3} *2 (100)

Notes:
1. The figures in parentheses are the values compared with the figure of Japan expressed as an index (=100).
2. The Chinese data is based on TSP (Diameter of particle is below 100 μm.) and the Japanese data SPM (Diameter of particle is below 10 μm.)

Source: Surveyed by company A

(2) Technical cooperation with China and future development

Table 2-6 shows the points involved in technical cooperation with China and future development. In future, as an

Table 2-6 Technical Cooperation between Japan and China and the Future Developments

1. Research Cooperation

1994	Environmental preservation policy survey (Formation of Energy saving plan)	Liaoning Province, Benxi City
1995	Environmental preservation policy survey(Formation of waste reduction plan)	Capital Steel General Company
1997	Exchange meeting between Japan and China for energy saving in steel production	In Beijing

2. Model project

1993	Facility for the use of wet lime in steel manufacturing	Chongqing Steel Company
1993	Facility for the recovery of heat from hot air from blast furnaces.	Laiwu Steel General Factroy
1994	Facility for using the pressure at the top of blast furnaces.	Panzhihau Steel General Company
1994	Facility for the recovery of heat from a fusion cooler	Taiyuan Steel Limited Company
1997	Facility for the dry fire extinguishing of coke.	Capital Steel General Company (AIJ)

AIJ: Activities implemented jointly

3. Technical exchange, personnel training, model city plan and others.
   (1) Technical exchange, personnel training
      [1] Dailan energy saving training center
      [2] Sino-Japan Friendship Centre for Environmental Protection
   (2) Model city Framework
      Dalian City: Kita Kyuushu City, Maizuru City
      Chongqing City: Hiroshima City
      Guiyang City: (no corresponding city)
   (3) Acid Deposition Monitoring Network in East Asia: Full operation in 2000
4. Future developments
   (1) Feasibility study of the Kyoto Mechanism*
      [1] Investigation for the introduction of the system of the residual heat use in electric furnace: Wuyang Steel Company, Tianjing Steel Company, The Third Factory of Shanghai, The Fifth Factory of Shanghai
      [2] Concentration and increase of scale of electric furnace: Shenyang Steel Company
   (2) Promoting the setting up of technology exchange for the technology transfer, the training personnel, the model city plan, and the setting up the East Asia Environmental Information Network and other projects.

*The Kyoto Mechanism: An international framework set up at COP 3 (in Kyoto) based on 3 flexible measures (joint implementation, emissions trading, and CDM (Clean Development Mechanism)).

Source: Surveyed by Company A

application of the Kyoto Mechanism the promotion of energy reduction, the exchange of technology related to environmental energy, the creation of a wide area environment network and other measures will hold a central position.

2.7 Conclusion

The steel industry has taken up environmental improvement as one of its management principles, and has come to grips with policy independently. The achievements are as laid out in the detailed discussions, but the following are the principal factors which have made them possible:

1. The will to invest under conditions of high economic growth.
2. Government regulation and financial assistance.
3. The existence of technical groups with a rich experience.

After these, the system and the background constructed by the national government and local governments for the improvement of the air quality have provided great additional motivation. Amongst these measures the role played by the pollution prevention agreements concluded between industry and local government is said to be very large. In the future coming to grips with the transfer overseas of technology and systems based on the above successes is an extremely urgent problem.

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(4) The Tokyo institute for municipal research, research division, (1994) *City self governing body's environmental administration*, Tokyo institute for municipal research (in Japanese).

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3. Environmental Governance and Automobile Industry - The Role of Automobile Exhaust Regulations in Protecting the Environment -

3-1. Introduction

The 1970s saw several of Japan's automobile manufacturers struggling to survive. Each year brought increasingly strict emission regulations (See Table 3-1), which these companies had to meet, step by step. In addition, the companies that had established a foothold in export markets were also determined to meet U.S. regulations at all costs. Fortunately, the industry solved its exhaust regulation problems through R&D programs that put the very existence of automobile companies on the line.

In this paper, we intend to use Japan's example of meeting ever-stricter automobile exhaust regulations to introduce "The Role of Regulations in Protecting the Environment."

(Note)

Three regulated pollutants, and their effect on health will be discussed in this chapter:

i) CO: Carbon monoxide poisoning (dizziness, headaches);

ii) HC: Adverse effects of photochemical oxidants; and

iii) NOx: Adverse effects of photochemical oxidants.

3-2. Historical process of introducing automobile exhaust regulations (See Table 3-1)

With respect to automobile exhausts, it was the U.S. state of California that first clarified the connection between automobile exhaust emissions and air pollution. To begin with, the state issued regulations on crankcase exhaust gas, which consists mostly of hydrocarbon (HC) in 1963. Next, the state also introduced auto emission regulations for 1966 model year vehicles which targeted HC and carbon monoxide (CO) emissions. By the 1968 model year, the remaining 49 states followed the exhaust emission

Table 3-1 Trends in Exhaust Emission Regulations in Japan

Year	Contents
(1960s)	Laws on smokestack emissions,Laws on water quality in oceans, lakes and rivers.
1964	Report of the Council on Basic Traffic Problems, "Long-term Plan for Preventing Toxic Automobile Exhaust Emissions" (Ministry of Transportation)
1966	Enactment of Standards for Toxic Automobile Exhaust Emissions (Ministry of Transportation)
1967	Basic Law for Environmental Pollution Control Atmospheric Pollution Prevention Law
1969	Pollution Diet. Requirement for manufactures to attach vehicles with equipment of crankcase exhaust gas reduction for HC emission control.
1970	Establishment of Environment Agency
1971	Enactment of the HC, CO, and NOx regulations (10 mode test method)
1973	Introduction of Unleaded gasoline (Gradual phase-out of leaded gasoline),
1975	Control on motor vehicles in fiscal year 1975 (Enforcement of regulations on CO=2.1g/km, HC=0.25 g/km, and NOx=1.2 g/km)
1976	Control on motor vehicles in fiscal year 1976 (enforcement of interim regulations on NOx)
1978	Control on motor vehicles in fiscal year 1978 (enforcement of regulations on NOx=0.25 g/km)
1990s	Revision of Test Method
2000s	Introduction of Japanese Low Emission Vehicle (LEV)

Source: Author

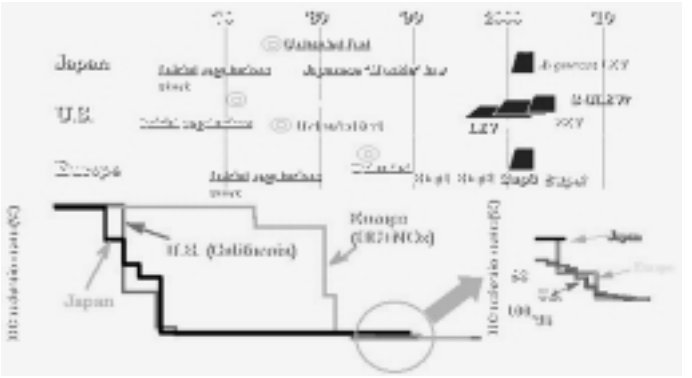


Figure 3-1 Trends in Emission Regulations in Europe, Japan, and the U.S.

regulations. Thereafter, testing procedures were changed and regulations tightened about every two years. Then, in 1976, the United States enacted the Muskie Law, extremely stringent legislation that limited HC and CO emissions to 10% of 1970 levels and NOx emissions to 10% of 1971 levels.

Japan's domestic regulations followed the U.S. case. The "Report of the Council on Basic Traffic Problems" was published in 1964, in response to complaints about headaches and dizziness caused by high concentrations of CO. The report called for 1) development of devices to prevent dispersion of exhaust gases, 2) comprehensive re-evaluation and improvement of automobiles, 3) use of higher-quality fuels, and 4) requirements for periodic maintenance of all vehicles. That same year, the Japan Automobile Manufacturers Association (JAMA) set up the "Conference on Automobiles and Air Pollution Problems in Japan," which helped the Ministry of Transport prepare its Long-Term Plan for Preventing Toxic Automobile Exhaust Emissions.

The Ministry of Transport announced its "Standards for Toxic Automobile Exhaust Emissions" in 1966, the same year it required automobile manufacturers to equip vehicles with devices to reduce exhaust gases, thereby decreasing HC emissions and helping to eliminate a major cause of photochemical smog.

In the 1970s, influenced by the United States introduction of the Muskie Law, Japan also tightened its exhaust emissions standards continually, issuing new statutes in 1973, 1975, 1976, and 1978 (See Figure 3-1). Obviously, the rapid pace of change in exhaust emission regulations in both Japan and the United States forced automobile manufacturers into a fever pitch of technological development.

Furthermore, the use of lead was also restricted gradually and finally prohibited in 1975. It was widely used to increase the octane content of gasoline in automobile operation. However, this resulted in lead poison and the deterioration of catalysts in catalytic converters, which later became standard emission control technology. Therefore, unleaded gasoline turned out to be indispensable for meeting emission exhaust regulations.

3-3. The automobile industry responds (Methods for reducing CO, HC, and NOx emissions)

All of Japan's automotive manufacturers invested a great deal of financial, physical, and human capital in finding solutions to these problems. The number of people assigned to R&D on exhaust emissions burgeoned from about 1,000 in 1969 to more than 7,000 in 1975. And R&D budgets increased more than tenfold, from some 5 billion yen in 1969 to about 70 billion yen in 1975.

Many technological solutions were proposed, and the challenge of commercializing them was met head-on (See Table 3-2).

Table 3-2 Development Trends in Exhaust Emission Reduction Technology

Regulations	Technology introduced
1973 regulations	Ignition delay technology (lower combustion temperature, reduced production of NOx)
1975 regulations	Oxidizing catalysts + EGR, stratified combustion, thermal reactors
1976 regulations	Oxidizing catalysts + EGR, stratified combustion, lean-burn combustion
1978 regulations	Three-way catalytic converters + EGR + oxygen sensors (finally)

Source: Author

Some of the ideas included catalytic converters to clean exhaust gases before they exited the tailpipe, improved combustion control technology (such as stratified combustion, a Compound Vortex Combustion Chamber (CVCC), and lean-burn combustion), and incinerating toxic emissions with thermal reactors placed in the exhaust system itself. Trial-and-error testing of these ideas continued. In the final analysis, the industry settled on catalytic converters as the best way to meet 1978 emission standards while maintaining traditional automobile performance characteristics.

The historical trends in catalytic converter development is as follows:

Catalyst manufacturers had long proposed the use of catalysts to reduce exhaust emissions. But at the time, catalysts were not yet practical. Many questions remained unanswered: could catalysts, based on chemical reactions, work well with engines, which are mechanical? Most catalysts are used in chemical plants and oil refineries under rigidly controlled conditions; would they work in automobiles where conditions are constantly changing? Oxidization and catalytic conversions take place at very high temperatures; could they withstand the heat, and would their containers be durable enough?

Nevertheless, automobile manufacturers decided to use catalytic converters to meet 1975 U.S. emission standards. Considering the time required for U.S. government certification, Japanese R&D workers had only two and a half years to develop a practical converter - a very tight schedule indeed.

Beginning in the mid-1970s, Japan's automobile manufacturers purchased and evaluated samples from catalyst material suppliers all over the world, while conferring daily with experts on catalysts. They thought it would be a simple matter to make converters for automobiles. In truth, that was not the case. One of the biggest hurdles was lowering conversion onset (beginning) temperatures while maintaining conversion efficiency at high temperatures (high engine loads). Another different kind of hurdle was the catalyst makers' penchant for secrecy. They refused to allow automotive manufacturers to analyze test results in-house.

Instead, the catalyst makers took the test data back and returned with the results another day. Some automotive manufacturers, convinced they would never meet their deadline by cooperating with catalyst manufacturers, started their own catalyst development programs.

In-house development required the screening of thousands of possible catalysts, evaluating their performance on actual vehicles, and conducting repetitive durability tests. At the same time, automobile manufacturers focused their energies on developing methods of coating ceramics with precious metals as well as manufacturing processes. Naturally, the in-house programs had not progressed smoothly. In 1972 congressional hearings, automotive manufacturers detailed the many difficulties in meeting the planned 1975 regulations, and gained a one-year extension.

With their remaining time, they concentrated on improving catalyst efficiency and useful life, while maintaining vehicle driveability, improving fuel efficiency, and finding ways to prevent catalysts from overheating. And one step at a time, they managed to overcome every obstacle.

One such obstacle was assuring catalyst reliability with Failure Mode Effect Analysis or FMEA. Ordinarily, new product development consists of a series of tests in which failures are remedied before the next test begins. After the product has been proved through testing, it is used on a limited number of production vehicles, then gradually added to more new vehicles as the technology matures. The tight deadline for catalytic converters, however, allowed no time for this traditional approach. All new cars of a specific model year had to be equipped with catalytic converters at the same time, which made assuring their reliability a difficult matter indeed. This requirement prompted manufacturers to consider the use of FMEA to assure reliability. Up to that point, the system had been employed in aeronautics and space development for reliability assurance, but not in the automotive industry. First, all components and compatibility factors in engines and their exhaust emission reduction systems, along with the possible effects of their non-conformity or breakdown of the entire system, were researched and identified. Thousands of forms were filled out and the stack of paper grew to tremendous proportions. Then a mathematical model was used to contrast these components and factors with data from actual reliability tests (several millions of kilometers of test drives) and forecast their reliability. In fact, the breakdown rate forecast with FMEA before production began proved nearly 100% accurate once the vehicles went on the market. This proved the effectiveness of FMEA as a forecasting tool. At first car manufacturers did not want to use FMEA because they had heard it was complex and cumbersome. But as more and more data on reliability was added, they came to realize that FMEA was an accurate, efficient way to establish the reliability of vehicles, components, and systems. FMEA is now widely used in the automobile industry.

In the same manner as explained above, materials and component suppliers joined with people at Japanese auto manufacturing companies -- everyone from product development to production engineers -- to produce the world's first "three-

way catalyst + EGR + oxygen sensor" systems. This technology remains the key to the development of the next generation of low-emission vehicles.

3-4. Conclusions

(1) Introduction of regulations based on an analysis of cost-effectiveness

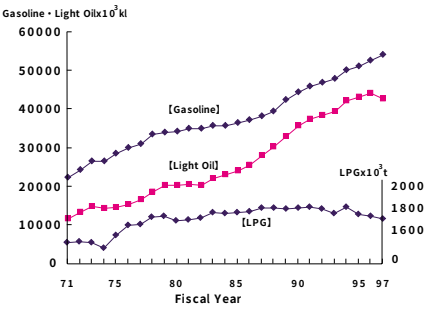
In Japan, emission regulations, including automobile exhaust regulations, resulted in a reduction of CO, HC and NOx to total emission levels of the year 1965 by 1985. The results of automobile exhaust monitoring conducted by the National Automotive Exhaust Monitoring Bureau are as follows. It is likely that emissions have been well controlled in general, giving consideration to a great increase of automotive fuel consumption (See Figure 3-2).

1) CO: According to Figure 3-3, CO levels have been reduced drastically, and now in compliance with the legal environmental standard (10 ppm).

2) HC: Figure 3-4 shows that HC levels have been reduced greatly as well. However, the legal emission standard (0.31ppmC) has not yet been achieved.

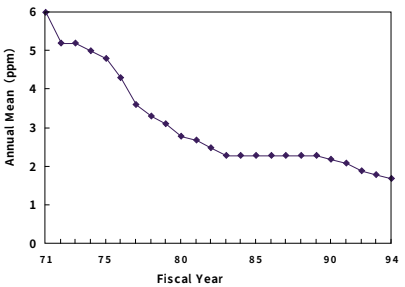
3) NOx: As Figure 3-5 shows, NOx and NO levels have leveled off, and there has been a tendency for them to decrease in recent years.

Of the several remaining problems, however, the concentration of NOx still exceeded standards in many places (See Figure 3-6). As the number of vehicles on the road



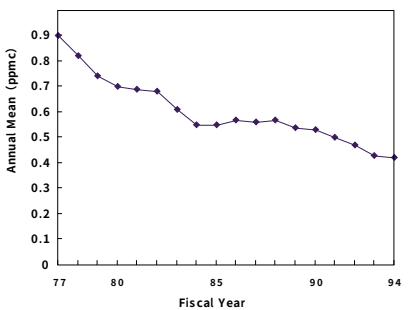
Source: Air Quality Bureau, Central Environment Council, Environmental Agency (1998)

Figure 3-2 Changes in Fuel Consumption for Automobile Vehicles



Source: Air Quality Bureau, Central Environment Council, Environmental Agency (1996)

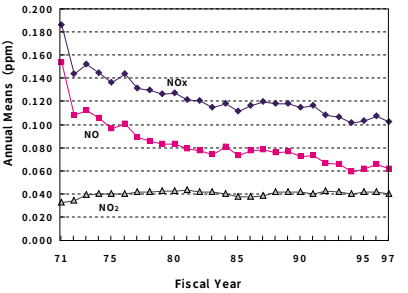
Figure 3-3 Changes in Annual Means of CO Levels Measured at 14 Monitoring Stations Which Had Continuous Measurements since 1971



Source: Air Quality Bureau, Central Environment Council, Environmental Agency (1996)

Figure 3-4 Changes in Simple Averages of Annual Means of Non-methane Hydrocarbon (HC) Levels between 6 a.m. and 9 a.m. Measured at 9 Monitoring Stations Which Have Been Taking Measurements since 1977

continued to increase, emissions of gasoline-powered automobiles steadily improved. But the makeup of road traffic changed considerably, with large diesel trucks and other such diesel-powered vehicles accounting for the bulk of motor vehicle emissions. But regulation of emissions from diesel vehicles lagged (See Figure 3-7). Finally, in 1992, the Automobile NOx Law went into effect, strengthening regulations in that sector.

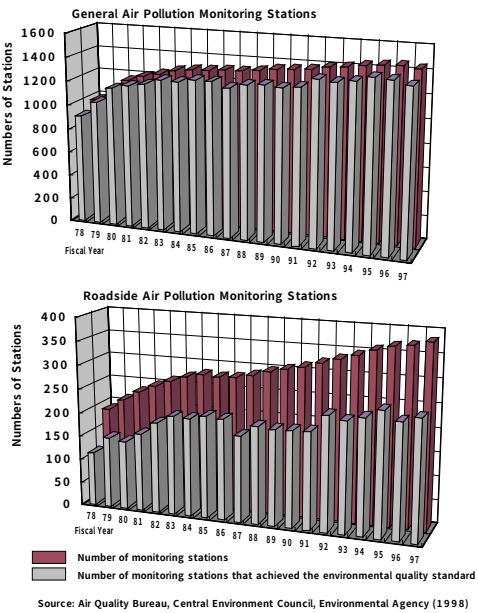


Source: Air Quality Bureau, Central Environment Council, Environmental Agency (1998)

Figure 3-5 Changes in Annual Means of NO_2 Levels Measured at 18 Stations (Roadside Air Pollution Monitoring Stations) which had Continuous Measurements since 1971

(2) Effects on the automobile industry

Japan's automotive industry has developed some of the world's most effective exhaust emission reduction technology, and has made big business of supplying the components required to meet emission regulations. Development of technology went beyond mere compliance with emission regulations. Manufacturers forged ahead, improving overall engine technology. These new technologies focus on areas such as performance (e.g., combustion control and multi-valve systems), fuel efficiency (e.g., lean burn and direct injection for gasoline engines), sophisticated catalyst and related technologies (e.g., NOx storage catalysts, fuel cells, ceramics) and advanced electronics (e.g., common rail small direct-injection diesels, hybrid systems, ITS), and Japan's automotive industry leads the world in many fields.

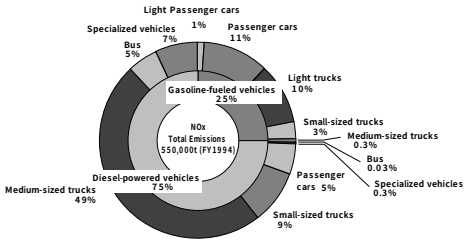


Source: Air Quality Bureau, Central Environment Council, Environmental Agency (1998)

Figure 3-6 Changes in Achievement Status of Environmental Standards Concerning NO_2

Japan's automotive industry has moved ahead in much more than the creation of new products and components. Methods for streamlining and strengthening R&D organizations to minimize the time required to solve technological problems

have been also devised. In short, they made Japan the world's premier automobile producing country. Especially noteworthy was the move by Japan's automobile companies to revise their organizations from being mere "car makers" to organizations where product planning, product development, and technology development could work together synergistically and progress could be continually monitored. These companies also benefited greatly from close cooperation with a broad range of parts suppliers, membership in the Inter-Industry Emission Control (IIEC) Program (the role of the IIEC, which engaged U.S. oil companies and U.S., Japanese, and European automobile industries, in developing anti-pollution technology cannot be underestimated), and overall cooperation on a global scale.



Source: Air Quality Bureau, Central Environment Council, Environmental Agency (1998)

Figure 3-7 Total NOx Emissions from Various Types of Automobile Vehicles

On the other hand, emission regulations placed a tremendous burden on automobile companies in terms of personnel and finances. As a result, consumers had to pay more for their cars. Also, because European emissions regulations lagged behind those of Japan and the United States, manufacturers in those countries were able to invest their own management resources into improving the basic performance (operation, handling, braking) attributes of their products.

(3) Issues to be considered

1) Introduction of regulations based on cost-effectiveness analysis

Since the "Pollution Diet" of 1970 removed the "economic compatibility article," regulation standards have been settled without cost effectiveness analysis. In particular, people in Japan have traditionally considered automobiles to be luxuries, and were unmoved by the huge cost burden placed upon the industry. Regulations on large trucks, on the other hand, would place the economic burden of increased prices on the public, and so were put off. As a result, NOx from diesel exhaust emissions are still a problem. These historical facts teach us that regulations should be enacted only after diligent monitoring of pollution and analysis of its true origins.

In addition, when starting and accelerating, automobiles emit a large amount of exhaust emission. Therefore, comprehensive strategies should be worked out with respect to infrastructure construction and traffic management, in order to cut exhaust emissions.

2) Transfer to developing countries

Burgeoning urban air pollution in the former Eastern Bloc and developing countries underscores the importance of transferring anti-pollution technology

developed in Japan and other industrialized countries. Experience in developed countries shows that the catalytic converter is the best available technology for emission control. With consideration of this knowledge, the introduction of lead free petrol is needed first in developing countries, in order to enact regulations.

3) Reconciling international standards and regulations

At present, Europe, Japan, and the United States have different emission regulations. Manufacturers must adjust their products to each of these markets, incurring additional costs. Domestic regulations that differ from international standards may well place non-tariff barriers to worldwide trade of products such as automobiles. Also, a single set of international emission regulations would go a long way toward the timely dissemination of anti-pollution technology. It also means that developing countries should not try to enact new and unique regulations, but rather learn from the experience of advanced nations and enact similar standards. This would minimize technology development costs. Nevertheless, the cost effectiveness of all regulations needs to be carefully reviewed before those regulations take effect.

4) The trend toward incentive-based policies

Until now, economic policies have consisted of diagnosing the problem, prescribing a cure, and reducing or cleaning up the pollution. In these cases, regulations played a larger role than might be imagined. They required considerable cost and sacrifice, but the results and experience gained were also considerable. Now, however, it is time to start programs of continuing improvement, based on what has been learned. Thinking must change from a regulated cleanup-after-the-fact mentality to one of proactive prevention and cooperation among various industries. Obviously, the most effective way would be to move from legislating ever stricter regulations to respecting the ability of the entities concerned by introducing policies based on incentives.

<<*References*>>

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4. Environmental Governance and Electric Power Industry - Global Warming -

4.1 Introduction

In about 1960, air and water pollution got worse in Japan as the economy expanded hand in hand with heavy and chemical industry expansion. To solve these pollution problems, it was not only regulation by national and local governments but also companies' own measures, such as pollution prevention agreements with regional people in anticipation of regulations, that were effective and pollution was overcome.

During this difficult negotiation, the electric power industry has coped with finding ways to overcome regional environmental problems and has realized that this is the most important task in management. The electric power industry has a characteristic strong relationship, as do other industries in their own ways, with regional areas, through consistent management from power generation to distribution. The electric power industry has applied developed equipment, such as exhaust gas desulfurizers, etc., as countermeasures to air pollution. The industry has coped with these problems by refining fuel for thermal power generation (introduction of low-sulfur crude, heavy oil and LNG) and expanding use of non-fossil fuel, the representative of which is nuclear power.

Then in the 1990's, global warming arose along with many other environmental problems. CO_2, which is included in exhaust gas as a result of energy use, has the greatest presence among greenhouse gases. To control emissions problems, the electric power industry is taking general measures, as follows, to deal with the situation.

4.2 Distinctive features of the electric power industry

The electric power industry in Japan consists of ten electric power companies which are located in district areas and are under consistently manage power generation, transmission and distribution and wholesale dealers, public management companies and mutual thermal power. The total volume of power generation facilities was 242,447MW at the end of the 1997 business year and the amount of electric power sold in the same year was 791,451million kWh.

(1) Change in energy demand

After the two oil crises in 1973 and 1979, the industries focused mainly on improvement of energy efficiency and succeeded in the improvement. Thereafter the demand for energy gradually increased until the middle of the 1980's. The demand for energy increased exponentially from the last half of the 1980's due to the wave of prosperity and the stable price of energy at low cost and has continued to increase consistently until the present except during 1992 and 1993 when there was a term of economic adjustment.

(2) Transition of electricity demand

Especially regarding the demand for electricity, as the economic structure changed and was followed by changes in society, as it evolved into a high information society requiring office automation, and the change in the people's lifestyle as they came to desire more comfort and security, electricity demand increased to become higher than the entire demand for energy. The rate of electrification (energy for supplying electricity / primary energy supply) reached 39.6% in 1996. Analysis of the transition in the demand for electricity until the present shows a growth rate in the term of economic expansion from 1987 to 1990 at a high of 6% a year and a low of 1% a year. The growth rate recovered to 3% a year after 1994, along with economic recovery and has stayed at that rate steadily until now. In this business year, 1998, the demand for electricity by industry is restrained because of the recession and the estimated growth rate for overall demand will be about 1% through the year.

4.3 Development of energy conservation and rule of fuel shift

(1) Expansion of energy conservation

The industrial world was well aware of technological developments for energy saving due to the oil shock crisis. It is said that the actual start of the development was in about 1973. This is because investment in technological development for energy saving became much less of a burden for them due to the rise in energy prices caused by the first oil crisis. The aim of industry was to lower costs as they proceeded with technological development and this consequently became connected to environmental improvement.

(2) Transition in efficiency improvement of general appliances

As Table 4-1 below shows, efforts to produce energy saving appliances for the use in household were made largely through the first (1973) and the second (1979) oil crises, however, this has leveled off since about 1990. On the other hand, the capacity per product has tended to become greater because of popularization of urban life, preference to convenient and comfortable life, and relative price decrease of appliances, which may offset the effect of saving per unit use of energy.

Table4-1 Change in Efficiency of Domestic Electric Appliances

	1973	1988	1994
2-door type refrigerator with freezer	80	26	27
19-20 inch color TV	140	83	80
Separate-type air-conditioner (1600 kcal/h class)	847	482	472

Source: Incorporated Body Appliance Association

Factors affecting energy efficiency include improvement of part quality, efficiency, insulating material, compressor technology, refrigerants, and control systems (micro-computers). It is true that economic incentives influenced the improvement as external factors.

To show the concrete factors that have brought about efficiency improvement,

the air conditioner for domestic use as a representative example shall be taken up in Table 4-2.

(3) The role of fuel shift in electric power industry

Regarding petroleum fuel, low sulfur crude from Southeast Asia and China such as Indonesian Minas crude, etc., were introduced with positive effect. In 1970, LNG, which contains no sulfur, was introduced for power generation and this was the first trial in the world. (LNG produced in Alaska was introduced for TEPCO's South Yokohama Thermal Power Plant, in 1970.) LNG holds 54% of thermal power-related fuel now. (Record in 1997 with a total of 9 companies, including LPG) As a result of such fuel shift, SOx / NOx emission units of electric power industry are now quite low levels compared internationally (See Figure 4-1, 4-2).

Table4-2 Factors Affecting Efficiency Improvement of Typical Electric Appliances

(1) Indoor unit
- ① Air-intake panel: big expansion from grill system to front open-close system
- ② Indoor heat exchanger: improvement of aluminum fin configuration-increase of area by bending heat exchanger itself
- ③ Outdoor fan: improvement of configuration/pitch/twist

(2) Outdoor unit
- ① Compressor: reduction of loss when compressing refrigerant/refrigerant leak. Smooth oiling of bearing
- ② Compressor motor: smooth operation from low speed to high speed by shifting to direct current
- ③ Outdoor heat exchanger: increase of surface area by shifting from L-shape to U- Shape

(3) Control methods

The key-point for energy saving is how the indoor and outdoor units should be controlled generally and efficiently.
- ① All direct current control: efficiency improved by approx. 10% compared with alternating current. Realization of efficient operation in general systems by smooth turning control with inverter control system.
- ② Soft control: control of both temperature and output air strength by searching for appropriate room temperature/wind speed/radiant heat which gives perfect comfort for people in a room.

Source: "Home and Electrification" July, 1997, Hitachi Living Systems Ltd.
"Energy Saving Technologies for Room Air-conditioner" by Yamatsu Norio

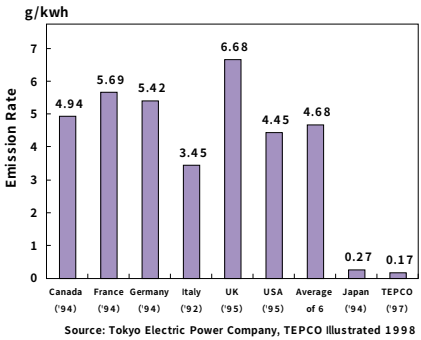


Figure 4-1 International Comparison of SOx Emission Rate

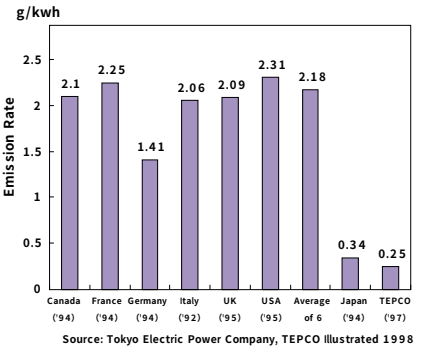
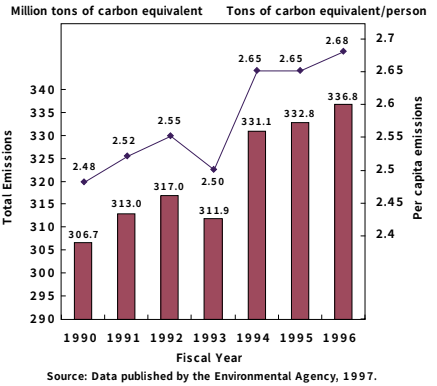


Figure4-2 International Comparison of NOx Emission Rate

4.4 Countermeasures for global warming - impact of the Kyoto Conference and current movements

COP3 (United Nation Framework Convention on Climate Change-Third Session of Conference of the Parties) was held in Kyoto in December 1997 and goals were set for numerical value reduction of greenhouse gases for the prevention of global warming. The Kyoto Protocol became a historical inheritance for Japan as the host country, but the numerical reduction value of 6% for Japan is very severe because of the situation, such as the actual state of energy saving activities and energy use efficiency and space the parameters for more energy saving efforts by industry are restricted



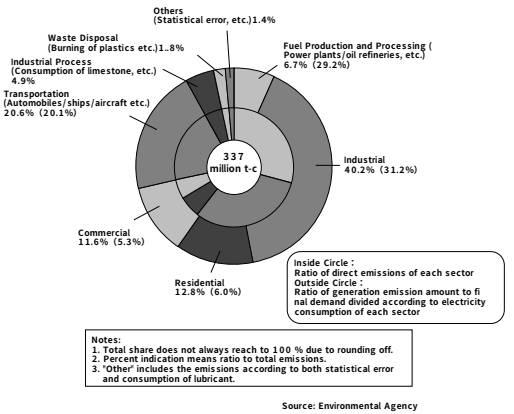
Source: Data published by the Environmental Agency, 1997.

Figure4-3 Changes in Japan's CO_2 Emissions

The present situation in Japan is as follows. In 1996, the actual CO_2 emission amount in Japan was 336.8million tons, which means a 9.8% increase compared with the amount in 1990. This is the standard year. If special countermeasures for emissions control are not carried out in the future, the estimated amount in 2010 will be 369million tons, which means 20% more than the standard year (estimated in 1998). Therefore, the set numerical value for reduction of 6% for Japan will increase to 26% by adding the estimated numerical value of 20% and Japan is being pressured to make a huge reduction(See Figure 4-3).

Regarding the six greenhouse gases regulated in the Kyoto Protocol, CO_2 is prominent among them through analysis of emissions records in Japan. In particular, CO_2 from energy combustion produces 85% of total emission, which holds a large majority.

The ratio of CO_2 emissions directly from the electric power industry to actual greenhouse gas emissions records in Japan is changing day by day due to the increase/decrease of electricity demand and the type of electric source, but it is



Source: Environmental Agency

Figure4-4 Sectoral Emissions of CO_2 in Japan (Fiscal Year 1996)

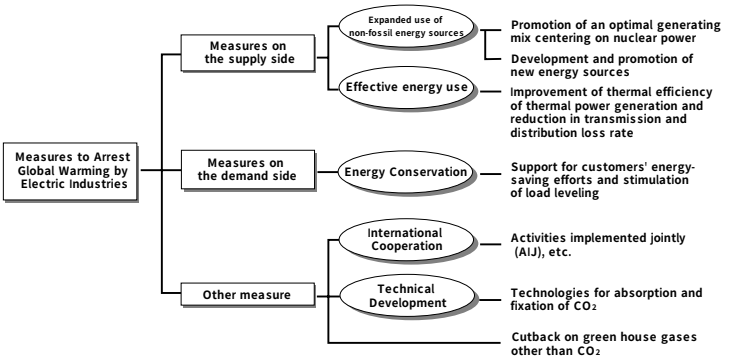
equivalent to approximately one forth of the entire CO_2 emissions. The electric power industry is carrying a rather heavy burden to achieve the set emissions reduction goal for all of Japan for the reason that it is impossible to not produce CO_2 when responding to the demand for electricity. The electric power industry is in a contradictory position as there is no choice but for them to supply power if there is demand, and they have to continually carry out long term electric source development, yet the industry is struggling to respond even though it is keenly aware of the need for countermeasures for global warming prevention (See Figure 4-4).

4.5 Position of the electric power industry

(1) The need for an overall strategy

The electric power industry, which is an energy conversion industry, is responsible for supplying electricity consistently and economically as required for industrial activities in modern society and everywhere in individual life. It is also necessary for the industry to control the amount of CO_2 production, which is varied by demand.

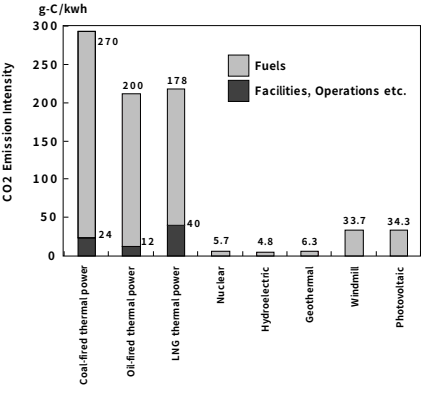
The electric power industry is coping with environmental problems, representative of which are countermeasures for global warming, considering the factors of energy security and economic efficiency. Coping with the global warming which aims at the so-called 3E (Energy, Electricity, and Emission), are different from usual regional environmental problems such as air pollution and no single countermeasure can control the phenomenon. General countermeasures applicable to everything related to the electric power industry are necessary. The countermeasures which they are currently undertaking consist of two points, the promotion of new energy and nuclear power, which are electric sources producing



Source: Tokyo Electric Power Company (1998), Environmental Action Report.

Figure4-5 Measures to Arrest Global Warming by Electric Industries

much less emission of greenhouse gases on the supply side and support of energy saving on the consumer's side. Also international strategies using the flexibility mechanism which were determined in the Kyoto Protocol and technological developments (absorption /fixation of CO_2 technology, etc.) and emission control of greenhouse gases other than CO_2 are active.



Source: A Report on "Analysis of Lifecycles of Power Generation Systems," Central Research Institute of Electric Power Industry (CRIEPI), March 1995.

Figure4-6 Comparison of CO_2 Emission Intensities of Various Power Station

By applying these countermeasures, the goal for the entire electric power industry to reduce emissions by 20% from the amount in 1990 (0.102kg-C / kWh) in the emission performance indicators in 2010 will be attainable ("Environmental Action Plan in Electric Power Industry" by Federation of Electric Power Companies, September, 1998) (See Figure 4-5).

(2) Strategy on the electricity supply side

1) Promotion of the best mixture in the structure of power generation

Energy security, economic efficiency and the environment are taken into account for a well-balanced combination of the structure of power generation by the electric power industry. Especially as regards nuclear power, it is true that there are different argument, but it is a quasi-domestic energy source and its priority is high for the guarantee of security for the country as Japan depend on other countries for more than eighty percent of energy resources. It is the most excellent system for the prevention of global warming because CO_2 production is significantly lower in every step from construction to operation (See Figure 4-6).

2) Development and diffusion of new energy

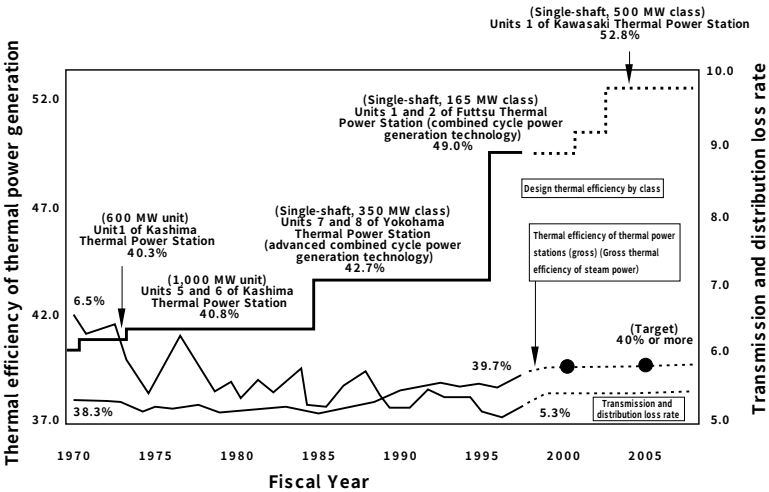
New energies such as solar power do not produce CO_2 when generating power so these are effective power generation systems for the prevention of global warming. The electric power industry is working hard on the development and diffusion of solar power generators for home use by buying surplus electricity produced by solar power generators installed in homes at the same price at which electricity is sold. These new energies, however, have little energy density as they are influenced by the weather therefore they can hardly become main electricity sources. For example, approximately 130 square kilometers (a little more than the area of Christmas Island) (twice the area inside the Yamanote Line) of coverage are necessary for a solar power system to produce the annual power output of a 1million kW class electricity source. More technological development for new systems is, of course, necessary in the future, but it is appropriate for these sources

to be used according their power generation characteristics as auxiliary electricity sources.

The electric power industry also buys surplus electricity from waste combustion generation in each local government. (TEPCO example: as of the end of March, 1998: purchased from 44 waste burning facilities, 2578 solar power generators, 4 fuel cells, 2 wind power generators)

3) Efficiency improvement in all aspects of power generation, transmission and power distribution

The improvement of thermal power generation is connected to reduction of fuel usage for power generation, therefore it is connected to not only reduction of fuel expenses but also resource preservation and CO_2 emission amount which is produced by combustion. In cutting age LNG thermal power plants, combined cycle power generation systems now put both of these merits together with gas turbine power generation and steam power generation. The heat efficiency rate level was previously at the most thirty percent, but it became more than forty percent after the combined system was introduced. Among the combined cycle systems, ACC (Advanced Combined Cycle) power generation, in which combustion temperature of gas turbine was raised to 1300°C from 1100°C, has



Source: A Report on "Analysis of Lifecycles of Power Generation Systems,
" Central Research Institute of Electric Power Industry (CRIEPI), March 1995.

Figure4-7 Thermal Efficiency of Thermal Power Generation (gross) and Transmission and Distribution Loss Rate

achieved the highest efficiency rate level of forty nine percent. An improved system which is called MACC (Most Advanced Combined Cycle), in which 1450°C combustion temperature is planned, will be developed in the future with the aim of a heat efficiency rate of fifty three percent.

The reduction of power transmission distribution loss rate is also connected to the reduction of electric power generation amount and this means that the fuel consumption rate and the production amount of CO_2 can be controlled as much as the reduced amount. There are more plans for introduction of new systems such as 1,000,000-volt ultra-high voltage power transmission and 500,000 volt underground power transmission systems, which will replace the usual 500,000-volt power transmission (See Figure 4-7).

(3) Countermeasures on the electricity usage side

Efficient and effective electricity usage is positioned to be an effective countermeasure for the environment because it is connected to not only CO_2 emission control but also resource saving. Therefore, various activities are being undertaken to promote efficient usage of electricity by users.

1) High efficiency appliances / development of systems, etc. / diffusion

- Thermal storage type air conditioning system: This is useful for peak-shift and excellent in energy saving. In particular, regeneration during the night greatly helps to reduce CO_2 emission because the power generation rate by fossil fuel is low.
- Regional heat supplement: Usage of unused energies such as temperature differences between water in river / sewers and outside air. Multi-functional heat pump system for ordinary residences.
- Energy saving appliances (Electric kettles, heated bidet systems)

2) Energy saving support / systems for proportional responsibility

- Introduction of various electricity fee discount systems for regeneration systems use
- Thermal Storage Service Program: subrogation of initial investment charges and system operation and administration
- Thermal storage by ice-making air conditioning systems (Eco-ice. Registered trademark)
- Energy saving vending machines (Eco-vender). Bounty system for diffusion promotion

3) Provision of useful information for energy saving to public

Usage of TV commercials and "notice of energy consumption" (receipt) to draw the users' attention to waste of electricity, clues for energy saving lifestyles

Consultation: Distribution of the charts of past electricity consumption amounts and measurement of stand-by electricity amount

(4) International strategy using the flexibility mechanism

The electric power industry has carried out strategies with a positive attitude as follows: promotion of electric source best mixture, efficiency improvement and

energy saving promotion at each level such as power generation, transmission / distribution of electricity, and the promotion of energy saving as mentioned above. The industry is also searching for concrete measures for how they can manage. This is, of course, based on technological cooperation and the flexibility mechanism (international cooperation for greenhouse gases reduction: emissions trading, joint implementation, Clean Development Mechanism) which were described in the Kyoto Protocol. These include how the industry can participate in and cooperate for the international strategy for the reduction and how they can apply the measures as complements for greenhouse gases reduction.

4.6 Method of transmitting Japan's experience in the future

The usual environmental governance measures, which are based mainly on global warming in the electric power industry, are as above and it is possible for Japan to transmit the message to neighboring Asian countries as follows.

(1) Choice of appropriate energy usage which is suitable for the conditions of the location: We can forecast that Asian countries, same as Japan, will face the severe condition for the location of plants and have to put great efforts for the environmental protection as they are now expected to grow rapidly. Overall measures of energy network covering supply, distribution and utilization of Japan as mentioned so far, would be possibly reference to Asian countries.

(2) Regarding global environmental problems, cooperation among nations is indispensable. It is necessary to establish an initial outline using flexible measure such as CDM and considerations of each country seems to be necessary as well.

4.7 Conclusion

The solution to global warming problems among global environmental problems is related closely and inseparably with energy consumption by activities that support modern civilization itself such as production and individual lifestyles. Therefore avoidance of the reality of the issue by the electric power industry, the principal secondary energy source, would be a serious problem. As mentioned above, the electric power industry pursues two policies, the achievement of a best mixture that is mainly based on nuclear power on the supply side and energy saving support on the usage side. The industry is proceeding with a general strategy in many fields including participation in international strategies and technology development.

As mentioned, to promote a solution strategy for global environmental problems such as global warming, the strategy cannot be only a lateral spread of the countermeasures for a solution among each industry or division. It is also necessary to structure a deeply rooted strategy to greatly reduce global warming with a long-term view and on a global scale. In other words, it is necessary at any cost to approach the solution from societal point of view, such as changing individual lifestyle attitudes to search for social and individual welfare by

separating from materials and energy sources as much as possible. This should be added to the present general countermeasures such as usage of energy resources (less carbon fuels) which contribute less to global warming and use energy efficiently.

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5. Environmental Governance and Chemical Industry - Chemicals -

5.1 Introduction

It was a series of pollution problems occurred in the 1970's that significantly raised general awareness in Japan of the impacts of chemicals on humans and crops. In this country, all manufacturing facilities were destroyed by air raids during the Second World War, and the nation has addressed postwar reconstruction of industries since 1945. It was after the 1960's that the Japanese economy started to see steady growth due to the introduction of leading-edge technology from western countries. During this decade, every key industry remarkably increased its production capacity, and Japan recorded the second largest GNP in the world in 1968. It is also true, however, that this rapid economic growth triggered a spread of pollution problems in the country. This chapter tries to explain how Japanese industries have been responding to environmental problems, taking case study of chemical industry. It is hoped that this paper will contribute to developing countries in some way when they work out environmental policies in the future.

5.2 History of pollution control regulations in Japan

Pollution problems induced by specific chemicals started emerging in the 1960's when Japan was just in the middle of its postwar recovery process. They include Minamata disease, cadmium poisoning among local residents in Toyama, and asthma caused by plant emissions in Yokkaichi. Now, the existence of causal relations between pollutants and health problems in these cases is recognized. In the 1960's, however, there were no criteria for certifying pollution diseases nor processors to handle suits filed in courts for delivering rulings. As a result, disputes were inevitably prolonged. Hence local governments found it hard to respond to public campaigns staged across the country demanding companies under fire to leave and to suspend their operations. In order to overcome this difficulty, local governments decided to enact ordinances for themselves. By 1970, all local governments had enacted ordinances to address pollution problems. The National Diet passed a series of anti-pollution laws in 1970, which constitute the foundation of the current legal framework. Under this national legal framework, the local governments urged businesses to show their commitment in writing by signing "the pollution prevention agreement".

As of 1996 as many as 50,000 sites signed the agreement (See Figure 2-9). These agreements usually contained the following requirements, depending on the pollutants (chemicals, prescribed substances etc.) handled or discharged by the sites;

“Establisment of the emission standards (concentration or total amounts)”,

“To take action as much as possible”,

"To cooperate with administrative guidance imposed by the local government".

Many of the agreements presented more stringent rules than the national laws and the local ordinances. This meant that triple controls of the national laws, the ordinances, and the agreements, were imposed on Japanese companies (sites). The agreements were disclosed to the public through official gazettes published by local governments.

5.3 The beginning of controls and measurements for chemicals

(1) Controls and measurements for specific hazardous chemicals

Several chemicals that caused serious pollution problems were the high-priority targets for regulation. Regulations on mercury and cadmium in water were introduced at the first stage. These regulations were designed based on studies to certify clear caused-effect relationships. For air pollution, regulations on SOx and NOx were prepared in the same way. In Japan, environmental standards to stipulate the quality of the environment were established based on scientific findings, and then emission limits were set for organizations to observe in order to satisfy environmental standards. In other words, emission limits are to be reviewed when environmental standards are not met. When in violation of emission limits, organizations must accept criminal liability as well as pay a penalty. This is one of the incentives for businesses to observe environmental regulations. The establishment of a nationwide monitoring system to determine whether organizations are in compliance with environmental standards also proved effective. Along with enhancement of the legal framework, various technologies have been developed to enable organizations to segregate, decompose, and recover gaseous / liquid / solid wastes. Due to these efforts, we have almost overcome pollution problems caused by businesses.

(2) Health problems caused by pollutants synthesized in the environment and measures taken against them

The first sign of a problem was detected in the out-skirts of Tokyo on a summer day in 1970 when several students suffered pains in their eyes and throats as well as difficulty with breathing during exercises in the school grounds. Thereafter school students suffered these health problems in cities and industrial areas around noon on very hot windless days. In an attempt to prevent these health problems, the national government enacted a series of oxidant limits in the air in 1972. And they revised the "Actions in an Emergency of air condition" of the Air Pollution Control Law so that it could demand manufacturers and transportation businesses to suppress emissions of NOx and hydrocarbons when oxidant concentration went up. As vigorous studies revealed the oxidation generation mechanism, local governments encouraged relevant manufacturing sites to reduce emissions of hydrocarbons by introducing such technologies as incineration, absorption, and recovery. Consequently those companies which have petrochemical complexes succeeded in reducing hydrocarbon emissions by about 60% from 1973 to 1978.

This level of reduction is far ahead of other industries (See Table 5-1).

Table 5-1 Hydrocarbons Emission from Fixed Sources by Source

(1981 Environment White Paper) (Unit : Tons)

Sources		FY 1973			FY 1978		
		Emission	Ratio(%)	Sub-total	Emission	Ratio(%)	Sub-total
Petroleum	Plant	100	---	198,000	100	---	162,800
	Refinery/Tanks	67,000	5.2		42,400	4.0	
	Oil Strage/Tanks	68,100	5.2		41,800	3.7	
	Filling Station	62,800	4.8		78,500	7.0	
Petrochem.	Plant	69,800	5.4	74,700	27,000	2.4	30,600
	Tanks	4,900	0.4		3,600	0.3	
Paint	Manufacturing	1,600	2.9	623,500	1,500	0.1	616,500
	Solvent for Car	37,500	1.5		45,500	4.1	
	Solvent for Ship	19,900	43.4		16,700	1.5	
	Solvent for others	564,500	---		552,800	49.5	
Ink	Manufacturing	200	8.4	109,800	100	---	81,100
	Solvent	109,600	3.3		81,000	7.2	
Others	Adhesive solvent	42,500	6.5		32,800	2.9	
	Metal degreasing	85,000	9.0	295,200	52,800	4.7	226,600
	Clothes cleaning	116,500	3.9		106,000	29.5	
	for rubber	51,200	100.0		35,000	3.1	
	Total Amount	1,301,200		1,301,200	1,117,600	100.0	1,117,600

Note : Figures for petrochemical are evaporation losses reported by the Petrochemical Industries Association,and the scope of its survey is limited to its member companies. The figure for Plant of petrochemicalcomes from the limited number of plants which produce fundamental petrochmicals of high-volume production. It does not reflect,therefore,evaluation loss in the entire perochemical industries.

In other words, petrochemical companies located in industrial complexes reduced emissions of all high-volatility hydrocarbons in the late 1970's. There was not sufficient scientific evidence available at that time to tell manufacturers exactly which technologies would be appropriate. Within the limitations, though, there were several options from which manufacturers could choose, depending on the conditions of their facilities: adsorption processes, absorption processes, flame incineration processes, catalytic incineration processes, cooling coagulation processes, membrane separation processes, etc. As a result, the number of days when photochemical oxidant concentration went up decreased gradually.

5.4 Standard regulations focusing on chemicals

(1) Response by Japan in the 1980's

In 1978, 14,000 people who ate dishes cooked with PCB-contaminated rice bran oil had PCB accumulated in their bodies, and developed chlorine-induced skin trouble and liver disorders.

This incident triggered the introduction of a new law to regulate bio-accumulating compounds in 1983: the Law Concerning the Examination and Regulation of Manufacture, Etc., of Chemical Substances. Under this law, a system was established in which manufacturers were urged to enhance management of chemical production. This was the first case in the world that highlighted problems related to persistent organic compounds (POPs). Meanwhile trichloroethylene and tetrachloroethylene were found to contaminate underground water in the Silicon Valley in America. Also in Japan the same underground water contamination was reported in many places (dry cleaning washing facilities etc.). In order to address this, the national government set up provisional administrative guidance in 1984, and then urged businesses to enhance their discharge management in 1989 by using discharge limits and the Law to Regulate Chemical Evaluation, Production, etc. Finally in 1989 the Japanese government started to

take full-fledged action against CFCs in accordance with the Montreal Protocol.

The manufacturers who had made CFCs began intensive development of substitute chemicals (HFCs) and the government accelerated reduction of total CFC production through a new law in advance of the schedule of the Montreal Protocol.

Otherwise, CFCs mainly used for refrigerators and freezers were recovered or decomposed by special industries and these activities are continuing in the present.

As discussed above, Japan responded to environment problems induced by the "use" of chemicals on an one-by-one basis. For the "production" and "disposal" of chemicals, however, we did not see any serious problems in the 1970's and 1980's although chemical concentration in the environment was monitored. This was partly because the Waste Disposal and Public Cleaning Law was enacted in 1970 which banned the disposal of organic compounds in landfills. More precisely, environmental pollution problems which trouble us seriously at present are caused by trace amounts of chemicals, and that level of chemical concentration could not be detected until high-precision analytical techniques (GC-MS) were introduced in the 1990's.

(2) Accidents that induced environmental contamination in western nations

Since the late 1970s a number of accidents have taken place. These were caused by American or European enterprises and have created serious environmental contamination.

Before these accidents, western citizens had perceived chemical industry as a very important and stable industry. But with these accidents as a trigger, they began to look closely at chemical industry with suspicion, and environment protection activities began as a social movement. In response to this momentum, western chemical industry began to start a "Responsible Care (RC)" program to recover the lost reliability. At the same time, western governments began to establish management systems for chemicals, (such as the PRTR scheme) and to enact environmental regulations with cooperation among those governments (See Figure 5-1).

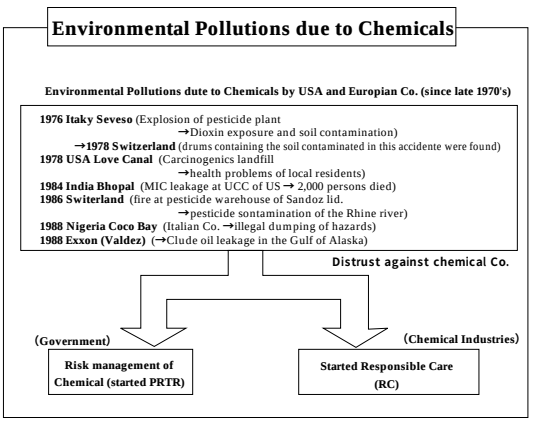


Figure 5-1 Author

5.5 Introduction of full-fledged chemical regulations in Japan

Global environmental problems have been getting serious since the late 1980's and Japan is no exception in that it faces various challenges such as the shrinking of wildlife population, energy saving, and a review of CFCs and other chemicals that had once been thought of as harmless. In addressing these issues, the Japanese government found it necessary to review the existing legal framework that had been constructed based on the traditional concepts of "pollution". In 1994 the fundamental law was fully revised from the Basic Law for Environmental Pollution Control to the Basic Environment Law. The revised law introduced a new concept of "measures against global environmental problems and preventive measures to protect nature", and it aimed at promoting action from the viewpoint of "prevention of pollution". Along with this concept, regulations against chemicals were incorporated in to water quality control in 1994. To be more specific, environmental standards were established for fifteen chemicals within the categories of organic chlorides, metals, and pesticides (See Table 5-2).

Table 5-2 Environmental standards (Water quality for human health)

	Chemicals	Standard
1	Cadmium	0.01 mg/l
2	Total Cyanide	Non detected
3	Lead	0.01 mg/l
4	Chromium (VI)	0.05 mg/l
5	Arsenic	0.01 mg/l
6	Total mercury	0.0005 mg/l
7	Alkyl mercury	Non detected
8	PCBs	Non detected
(Added in 1994)		
1	Dichloromethane	0.02 mg/l
2	Tetorachloromethane	0.002 mg/l
3	1,2-Dichloroethane	0.004 mg/l
4	1,1-Dichloroethylene	0.02 mg/l
5	cis-1,2-Dichloroethylene	0.04 mg/l
6	1,1,1-Trichloroethane	1.0 mg/l
7	1,1,2-Trichloroethane	0.006 mg/l
8	Trichloroethylene	0.03 mg/l
9	Tetrachloroethylene	0.01 mg/l
10	1,3-Dichloropropene	0.002 mg/l
11	Thiuram	0.006 mg/l
12	Simazine	0.003 mg/l
13	Thiobencarb	0.02 mg/l
14	Benzene	0.01 mg/l
15	Selenium	0.01 mg/l

Author

Carcinogenic substances were also added to the list although it was regarded as reasonably impossible to set any appropriate tolerable values. A new procedure was adopted to determine environmental standards for these substances: to set environmental standards, taking ingestion paths to human bodies into consideration, in a way that would suppress the lifetime probability of cancer development below a certain level. This procedure proved effective in moves among western countries to enhance control over chemicals. Estimation using probability theories was newly adopted to determine environmental standards in addition to the conventional theories using scientific cause-effect relationships. This approach was also applied to the Hazardous Air Pollutants Control introduced in 1997. Among twenty-two high-priority substances designated therein, three substances (namely benzene, trichloroethylene, and tetrachloroethylene), were selected for the setting of environmental standards. In this process, probability theories were employed. The Environment Agency accordingly notified local governments that exceeding these environmental standards for a short period of time would not necessarily induce health problems. In other words, standards worked out based on the probability theory are slightly different in nature from those based on conventional cause-effect relationships. Exposure to those substances with a higher concentration than that stipulated in the standards for a long time, however, will damage human bodies in one way or another. Therefore, how to measure these high-priority substances in the air and how to address contamination sources is being actively studied at present. In the future, substances against which environmental standards are set will gradually

increase in number while studies will be conducted to monitor emission / discharge reduction and improvement of air quality.

5.6 New phase of chemical control in Japan

A myriad of chemicals have been developed and produced as they are considered essential for industrial activities and national life. The total number of chemicals is estimated to be several hundreds of thousands. As many as twenty thousand chemicals are available in large volumes in the market. Chemicals have two contradictory features, which is particularly obvious in pharmaceuticals. They are very effective and have some hazardous side effects such as toxicity. They need, therefore, to be handled and managed in an appropriate way. For this reason, Japan has enacted a number of regulations to control each individual chemical in an effort to address specific problems caused by each one. Still there are large unknown areas concerning many of these chemicals. It is no longer easy to cope with chemical-relevant problems merely by imposing controls on individual chemicals. In other words, it is impossible practically and financially to set limits for numerous chemicals and monitor their concentration in the environment. As chemicals are used in a wide range of industrial sectors, it has also become necessary to manage chemicals throughout their lifecycle (development-production-processing-consumption-disposal). While the authorities impose regulations on chemicals with high risks, those who actually handle chemicals need to voluntarily manage them in an appropriate way throughout their lifecycle. Management should be achieved twofold: legal management by regulations and voluntary management. The Hazardous Air Pollution Control of 1997 introduced the following framework in order to fulfill the twofold management, namely by regulations and voluntary management:

- The Environment Agency defines the outline of high-priority chemicals to be controlled.
- MITI selects some chemicals, focusing on HPVs (as voluntary management substances), and encourages the industries manufacturing / using them to perform voluntary chemical management activities (and take voluntary actions to reduce emission).
- Based on current management control of chemicals, and measurement results of chemical concentration in the atmosphere, the Environment Agency selects chemicals for which environmental standards need to be set (i.e. chemicals to be regulated by laws).
- The Environment Agency checks and reviews current measures by reviewing environmental monitoring results and interviewing businesses about voluntary chemical management activities.
- MITI checks and reviews action taken in each industry and provides guidance as necessary.

MITI has selected twelve chemicals for the industrial sector to manage on a

voluntary basis (See Table 5-3).

Table 5-3 The scheme of Hazardous Air Pollutants Control (at early 1997)

● : added in 1998

	Chemicals	Regulatory chemicals designated by EA	Voluntary management chemicals selected by MITI	High-priority chemicals designated by EA
1	Benzene	◎	○	○
2	Trichloroethylene	◎	○	○
3	Tetrachloroethylene	◎	○	○
22	Dioxins	●	●	○
4	Acrylonitrile		○	○
5	Vinyl chloride monomer		○	○
6	Dichloromethane		○	○
7	Acetaldehyde		○	○
8	1,2-Dichloroethane		○	○
9	Formaldehyde		○	○
10	Chloroform		○	○
11	1,3-Butadiene		○	○
12	Nickel and its compound		○	○
13	Ethylene oxide			○
14	Arsenic and its compound			○
15	Manganese and its compound			○
16	Mercury and its compound			○
17	Beryllium and its compound			○
18	Chromiume (VI) compound			○
19	Benzo[a]pyrene			○
20	Chloromethyl methyl ether			○
21	Talc			○
		(3)	(12)	(22)

Author

MITI also guided the industrial sector in setting to goals for the reduction of emission / discharge in their voluntary efforts. The overall target set by MITI for twelve chemicals was about a 30% reduction from 1995 to early 2000. For some chemicals, meaningful reduction targets could not be set partly because the main users of these were small-scale enterprises. For four chemicals out of twelve required to be voluntarily managed, on the other hand, their targets have been already achieved according to the 1997 Measurement Report presented to the Chemical Council at the end of last year. Needless to say, we must wait for measurement data to be reported in the future before stating anything decisive about how effectively chemical concentration in the environment has been improved. The voluntary management scheme is effective as the private sector is able to start with those chemicals whose reduction in emission / discharge is expected to have more significant impacts than others.

5.7 Establishment of overall chemical management

(1) Initiation of voluntary activities in the Japanese chemical industry

JCIA(the Japan Chemical Industry Association) which represents the chemical industry in Japan established the JRCC(Japan Responsible Care Council) in 1995 in order to promote the RC

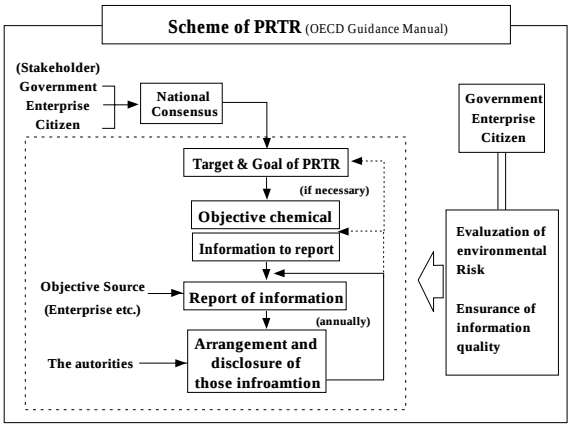


Figure 5-2

(Responsible Care) program that worldwide chemical industry had begun to tackle chemical problems with. The RC program is a voluntary activity in which companies are expected to pay attention to the entire lifecycle of products under the principles of self-accountability and self-decision in order to protect the environment, safety, and health and to ensure chemical safety.

As shown in Figure 5-1, the RC program was initiated by chemical industry in western nations. Agenda 21 adopted at the Rio Summit in 1992 recognized this program as an effective means for chemical management. At present, JRCC is composed of over one hundred companies who have agreed to the objectives of the RC program. The ultimate goal of the RC program is to inform communities of activities in chemical industry and to promote communication with them. In order to pursue these goals, JRCC holds seminars at many places to report what chemical industry is doing and to listen to the opinions of those concerned.

At the annual international RC conferences, JRCC reports its activities. JRCC has an Advisory Panel jointed by representatives of consumer groups and the media as well as a representative of the Chemical Labor Union or scholars from various fields. The Panel provides JRCC with various comments and guidance relating to its activities from an objective point of view.

(2) Trial of PRTR (Pollutant Release and Transfer Register) Scheme

The PRTR Scheme aims to have businesses register chemicals released from various sources or transferred. The register is a very effective means for authorities to evaluate risks of chemicals, for the general public to talk about risks with the industrial sector, and for businesses to objectively evaluate emission / discharge reduction and their commitment to the environment.

America and Europe launched this scheme, under a different name, in the late 1980's. Agenda 21 recommends this scheme as an effective means to regulate chemicals. As it picked up momentum, OECD published a guideline for the scheme in 1996 to recommend that its member nations introduce it. Figure 5-2 outlines the PRTR scheme.

Recognizing moves among western nations to introduce this scheme, JCIA started to study the feasibility of PRTR in 1992. In 1994, JCIA prepared a guideline for the calculation of emissions and discharges, and in the following year, it roughly defined groups of chemicals to be incorporated. Among them, JCIA selected fifty-five high-priority chemicals that needed to be promptly investigated, and asked its member companies to perform a full-fledged investigation. In 1996, JCIA expanded the list of chemicals from fifty-five to 152, and asked for their investigation. In the same year, JCIA reported the outcomes of the 1995 investigation to the Chemical Council. Meanwhile, OECD told its member countries in its recommendation presented in 1996 to report the progress of their efforts to the OECD Council to be held in 1999.

In response, the Environment Agency reported progress in Japan in 1996, and held the first international symposium in Tokyo. In this symposium, the Environment Agency announced that they would start a pilot program of PRTR

in three regions in Japan in 1997 to monitor total emission / discharge in these regions. The Environment Agency picked up 178 chemicals to be monitored in the pilot program. The Japan Federation of Economic Organizations (Keidanren) also set up a working group for the purpose of learning the PRTR scheme, since on emission investigation under the PRTR scheme mainly targets the industrial sector. Since 1997, Keidanren has asked its major member bodies (ca.50) to collect data on the same chemicals that the Environment Agency studied. This is purely carried out on a voluntary basis, but it is the first case in the world where the entire industrial sector has worked together to address the PRTR study. JCIA, already working on PRTR, added some more chemicals to the list designated by the Environment Agency to bring the number to 286 chemicals for investigation in 1997.

(3) Voluntary disclosure of total chemical management activities

JRCC started disclosing information about its voluntary activities in the RC Activity Report in 1996, three years after it launched the RC program. This report outlines JRCC work on the environment, safety, health protection, and chemical safety as well as regional and international activities. What should be noted is that the report places emphasis on total chemical management when describing how hazardous air pollutants are managed and how the PRTR scheme is addressed on a voluntary basis (See Figure 5-3(1),(2)).

As mentioned above, the Japanese chemical industries are making voluntary efforts to pursue appropriate management of chemicals, and actively publishing the outcomes of their activities to communities to promote communication.

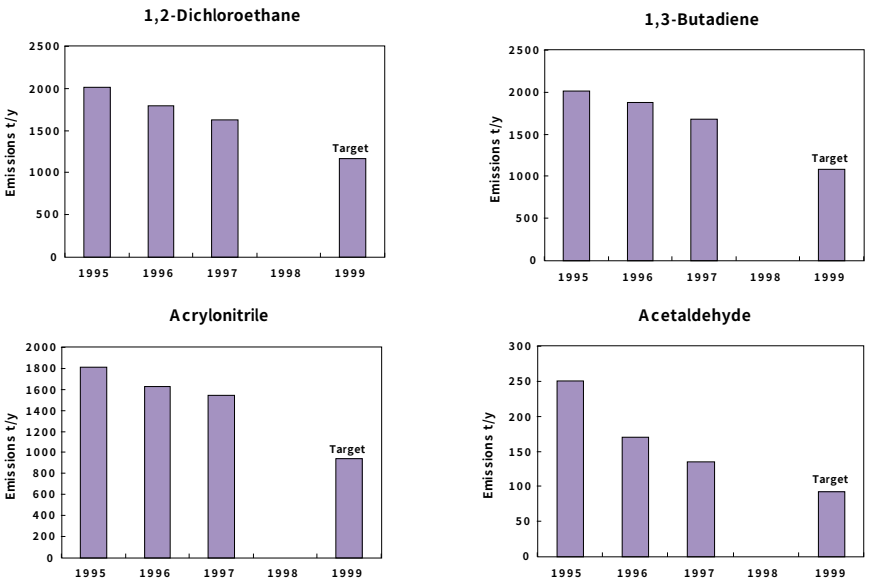


Figure 5-3 (1) Situations in Self-control Activities of Hazardous Air Pollutants - Emissions of 4 Air Pollutants -

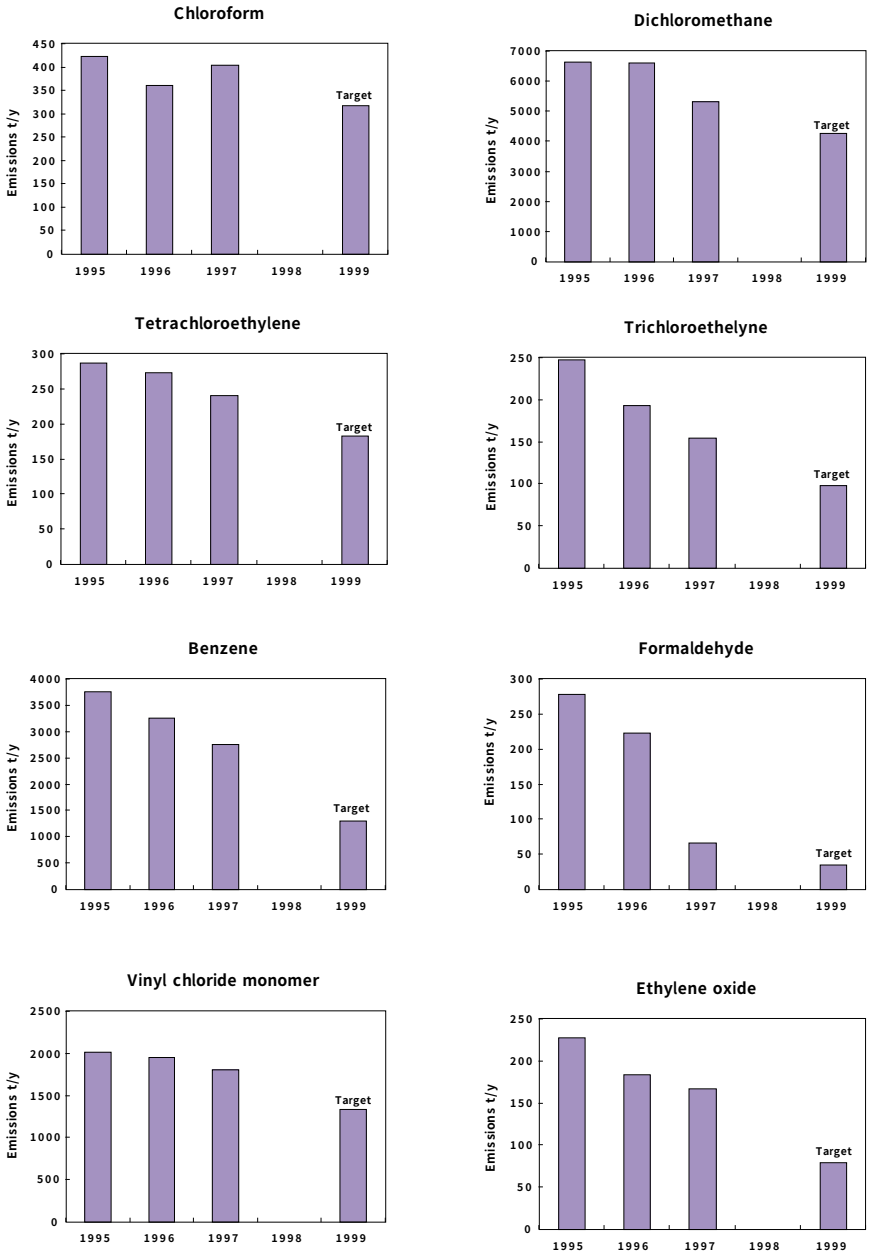


Figure 5-3 (2) Situations in Self-control Activities of Hazardous Air Pollutants - Emissions of 8 Air Pollutants -

5.8 Conclusion

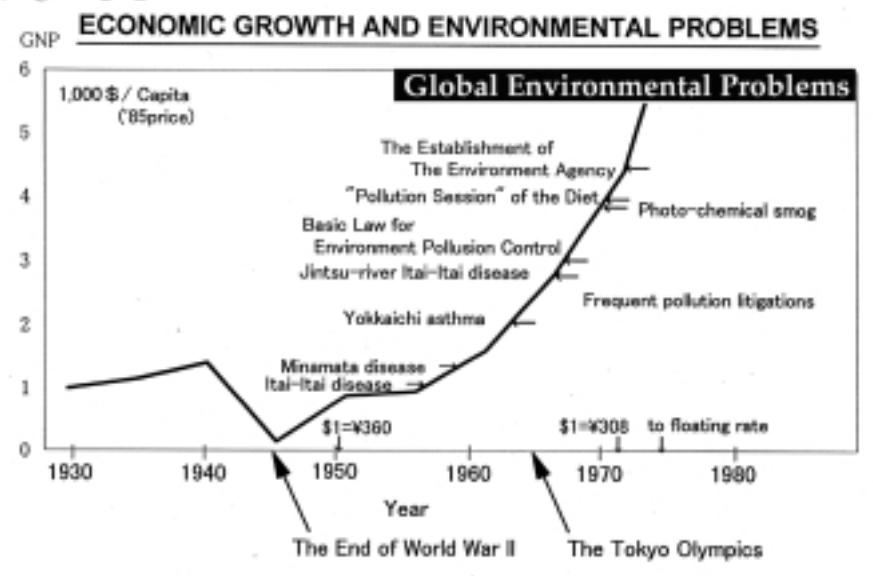
Introducing technology from advanced nations, Japan has succeeded in achieving economic rehabilitation after the Second World War. We failed, however, to foresee pollution problems induced by contaminants released intensively from manufacturing facilities installed in industrial complexes which were efficient but concentrated in extremely dense areas.

With precious experience in addressing various pollution problems, Japan has been accumulating expertise on environment technology and building new industries. Although in some ways Japan lags behind America and Europe in chemical management, Japan is far ahead with regard to taking action against photochemical oxidant problems which western nations are suffering from now. It was clearly because the technology, that accumulated among the pollution problems which Japanese industries suffered from, was effective. And after that, when new problems arose such as Hazardous Air Pollution Control, that technology was also effective.

Future generations will judge which one was correct of the Japanese approach and the western approach. Looking back at the history of Japan as it grew from a developing nation to an advanced nation, we can see that any nation may face environmental problems somewhere in their economic (GDP) growth path (See Figure 5-4).

It is my sincere hope that developing countries will look at the history of Japan and learn from it.

(Figure 5-4)



6. Environmental Governance and Forestry - Tropical Forests (Global Warming) -

6.1 Introduction

Deforestation, in particular deforestation of tropical forests, is a very important problem among global environment issues. Forests fulfil an important function in the conservation of the environment, and provide wood, the only renewable natural resource. Furthermore, the function of wood and forests in the mitigation of global warming has recently drawn attention.

Japan depends on overseas countries for wood resources. It is assumed that this dependence will not change future. When considering environmental governance in Japan's forestry and wood product industry, it is important to consider environmental governance by enterprises with regard to imports on the international scene. This chapter focuses material imports for wood and paper manufacture. This case study might be instructive when considering other cases of the numerous imports of primary products to Japan.

6.2 Particularities of Japanese forest resources and forestry

(1) Situation of Japanese forest resources

Our forest resources cover an approximate area of 25 million ha, and occupy about 70% of the national territory. Comprising roughly 10 million ha, the percentage of planted forest surface is significant, accounting for about 40% of the total forest surface, roughly half of timber stock. Each year stock increases about 7000 m^3 is raised, although most of it was planted after the war, and 80% of this amount is immature wood of less than 35 years that is not yet ready to be cut (See Table 6-1).

Table 6-1 Present Situation of Forest Resources in Japan

	Total		Proportion of man-made forest	
	Surface(1000 ha)	Stock ($100m^3$)	Surface(%)	Stock(%)
Total	25,212	3,138	41.0	50.9
National forest	7,861	858	31.4	27.7
Communal Forest	2,700	313	44.0	51.5
Private Forest	14,651	1,967	45.5	60.9

Source: Forestry Agency

Altough Japan in one of the forested countries in the world, non-mature wood is plentiful there and forestry has had a lot of difficulties in terms of an industry. Therefore, the self-sufficiency in wood has not reached to 20% in Japan. The above-described situation of the Japanese forestry and wood industry shares common points with many other primary industries.

(2) Problems faced by Japanese forestry

Japan is a mountainous country with forests situated in steep areas. Such topographical conditions present numerous handicaps to the wood producing aspect of the forestry industry, for example: the high cost of building roads, low

workability and difficult mechanization. From an economic point of view, owners of small forests of less than 5 ha own 90% of the total, and many of these forests are of a size that does not allow the owners to manage them by themselves. With its topographical handicaps and management size problem, Japanese forestry presents characteristics that show that it can not be managed as a modern industry. There are problems in the field of forestry workers too, with their aging and they're diminishing numbers. While the number of workers diminished by one half between 1985 and 1995 (from 140,000 workers to 70,000 workers), the average worker age jumped from 59 to 69 years old.

During the ten years between 1985 and 1995, Japanese cedar timber prices fell by 23% and forestry income dropped by 31% revealing the continuing decline of forestry management[1]. If one compares log prices, standard prices are: 16, 000 yen for Japanese cedar, 36,000 yen for Japanese cypress, and 18,000 yen for American hemlock (in cubic meters, January 1999). If the Japanese material production cost is 100, New Zealand stands at 34 and Canada between 32 and 57. If the Japanese reforestation cost is set at 100, the United States stands at 6.5 and New Zealand at 13, making it easily understandable why we can not be competitive internationally if production costs are to be considered[2].

6.3 Japanese wood supply-demand and import trends

Our country wood supply-demand has been hovering in past years around a figure of 100 millions m^3, but was about 92 millions m^3 in 1998. Of this amount, the share of imported wood was 73.6 millions m^3, and the national produced wood share was 18.5 millions m^3, making a self-sufficiency rate of about 20%. The self-sufficiency rate has been taking a downward trend since 1969, when it was less than 50% (See Figure 6-1)[1]. The 1996 wood figures show a national produced wood share of 20%, 24.9% coming from America (Canada and United States), 5.1% from the Northern Seas (Russia), 14.8% from the Southern Seas (Malaysia and Indonesia), and 22.1% from other locations[3] . Divided by purpose: 44% are for lumbering, 39% for pulp / chip, 14% for plywood and 3% for other purpose[1].

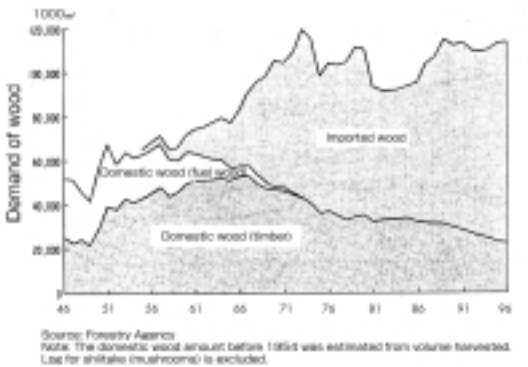


Figure 6-1 Trend in Wood Supply (Domestic wood and imported wood

6.4 History of Japanese wood imports

(1) World history

It is possible to go far back in the past when examining the international wood trade. In times when individual property rights were not clearly defined, and when wood was a common wealth, wood was a free material[4]. When people couldn't find wood in their immediate surroundings, they started going farther abroad to look for it . In ancient times, Lebanon Cedars were transported to Egypt and Rome, and in the Modern Age, the wood for the masts of Great Britain's sailing ships was imported from Scandinavia and Canada. Fragrant wood and rare foreign wood like the kind found in the Shosoin's treasures also came to Japan from overseas. The wood brought from far away was limited to costly items like special wood or big shavings. It is only in modern times, with the advent of great capacity maritime transportation vessels, that wood used in our lives has become an international trade commodity. Let us have a look now at the small history of Japanese wood trade.

(2) Japanese wood international trade

Today Japan imports wood from numerous countries, but few people know that Japan was a wood exporting country during the Taisho Era (1912-1926). If we look back at the history of Japanese wood imports, it can be divided roughly into four periods: from the Great Kanto Earthquake to post-war (prehistory), the post-war recovery (growth period), the high growth period (golden age) and the present-day.

1) From the Great Kanto Earthquake (1923) to Post-war (1945)

The peak of wood exports during this era was in 1920, with 24.7 million yen exported (and 23.37 million yen imported). The exported woods were products of Hokkaido called Nara Wood and Inchi Wood, mainly sent to Great Britain via the port of Otaru. Railroad ties, fir lumber for tea boxes and lumber for matches were the others exports. In 1917, exports amounting to 14.78 million yen exceeded the 4.94 million-yen worth of imports by 9.84 million yen. It is recorded that at that time, wood export was a good source of foreign currency income. With the prosperity in Japan following World War One, wood imports increased and Japan became a net importer in 1921.

The first occasion for Japanese wood imports to rise was the importation of mostly American lumber for the restoration that followed the Great Kanto Earthquake of 1923. If one looks at import statistics, imports were multiplied by a factor of almost 10 between 1920 (1.24 millions koku*) and 1924 (12.01 millions koku). Even after the demand that followed the Great Kanto Earthquake, foreign lumber continued to take a firm hold in the national market, rising to a peak of 14.96 million koku in 1928. Imports began to decline in 1929, following the sharp rise of Wood Custom Duties, and continued in a downward direction to a level 6.72 million koku in 1935, and 3.05 million koku in 1940. In 1944, imports were

totally stopped and reached the zero level.

(*1 m^3 =3.6 koku)

2) The Post-war Recovery Period (1945-1964)

1964 was the year of the Tokyo Olympics, and the year when log imports were totally liberalized. This year can be seen as a contact point between post-war recovery and the high growth period. Wood imported during this period served the purpose of complementing domestically produced lumber as a post-war recovery material and also as a material to produce plywood for export. From the import business point of view, it was a time of numerous restrictions on international trade with limitations on foreign currencies.

Post-war wood imports resumed with the import of 5,000m^3 of Philippine produced Lauan round logs in 1948. The round logs was imported by a public corporation for internatilna trade in order to produce plywood that would in turn be exported to earn foreign currencies, for the eventual purpose of purchasing the necessary supplies for post-war recovery. Based on the "Foreign Trade and Foreign Exchange Control Law" of 1950, the wood import business was transferred to private companies, and the amounts imported increased. In 1953, Southern Seas wood imports doubled from the previous year to 1.3 millions m^3. During the 50's the same Southern Seas wood accounted for the majority of wood imports, amounting to more than 70%. Southern Seas wood like Luan wood and plywood sheets occupied an important position in post-war recovery construction like housing. Plywood exports had an important role in the processing trade as a generator of foreign currency income. One third of the cost of imported Southern Seas wood (used as raw material) was earned in plywood exports. At this time, the Japanese foreign currency situation was severe. The exporting ability to export plywood and inch sheets to earn currencies for the processing trade was highly sought after, and general trading companies began during this period to enter this market and play an important role in the international wood trade.

3) The High Growth Period (1964-1985)

During this period, while wood imports were increasing rapidly, the Southern Seas wood producing areas changed, and the import patterns showed new developments too. During the five years following 1965, wood demand increased by 32 million m^3 exceeding 100 million m^3. The 1964 total liberalization of log imports was designed to cope with the flourishing wood demand generated by economic growth, but also had the effect of supporting the changes mentioned above as well. At this time, wood imports almost tripled, from 20 million m^3 to 56 million m^3, and the trend was towards importing in order to meet increasing demand. By 1969, the self-sufficiency rate was under 50%, from which point it continuously declined.

Wood imports from America grew from 4.24 million m^3 in 1965 to 12.5 million m^3 in 1970. American wood was used mainly as a construction material, competing in quantity and price with Japanese cedar and cypress. It soon developed from a simple role of supplement to an important position in the market. Southern Seas

logs imports doubled from 8.85 million m^3 in 1965 to 17.64 million m^3 in 1970. These figures continued to increase until they reached a peak in 1974 of 26.8 million m^3, after which they began to descend. The producing countries were the Philippines in the 60's, Indonesia in the first half of the 70's, and in 1976 the first rank was occupied by Malaysia from where more than 10 million m^3 were imported.

With regard to patterns of importation, in the case of the Philippines, importation was merely a matter of buying wood as an international trade activity. However, in the case of Indonesia, wood importation was mainly the activity of Japanese general trading companies that had developed resources abroad. General trading companies were the main players in tropical logs import, as nine of them were among the ten top importers during the first half of the 70's.

The pattern used by Japan of importing resources developed in developing countries was advocated at the 1963 United Nations Conference on Trade and Development on the grounds that it provided developing countries with technology and capital, promoted their economic development, and led to the stabilization and securing of natural resources for developed countries.

It can be said that development import method grew; the needs of Japan, a country willing to stabilize the supply of wood resources, were met by Indonesia, a country that planned economic development through the introduction of foreign currencies.

Shortcomings in this method on the side of business expansion (the Japanese side) can be summarized as follows: business expansion of a company centering on itself, lack of long-term vision, lack of understanding of technology exports and localization. The need to come to a satisfying agreement with natural resource exporters, to take into consideration natural resource nationalism, and to cooperate in the building of social infrastructures was raised[5]. These points were presented in 1978 as contemporary representative problems and issues as the only matters considered previously were the stabilization and securing of natural resources, and economic development problems in the producing countries. When considering the context of those times, the fact that an environmental vision was lacking couldn't be helped.

From the second half of the 70's, there was a fear in the Southern Seas Logs producing countries that forest resources could decrease. National governments thus provided companies with funds to reforest, and demand for technical cooperation appeared. Apart from the problem of funds and technique, a number of opinion pointed out that[6] there were problems to be resolved in the field of cooperation in putting reforestation into effect, for example: land ownership rights and the newly planted trees ownership rights. Put simply, some intellectuals pointed out that it was very dangerous to go on cutting trees in each country while being unaware of renewal technologies for deforested natural forests previously occupied by dipterocarp species (Lauan tree)[7].

With these numerous problems and issues remaining, tropical wood imports

continued to decrease. The Indonesian total ban on natural wood exports in 1985 was a big turning point, followed further in the second half of the 80's by pressure to cope with environmental issues[8,9].

4) The Present Day (1985-1998)

Wood import trends have greatly changed in the last ten years. The shape of imports has significantly changed, with a decrease of imports of tropical raw wood and an increase of processed wood imports.

a) The decrease of tropical raw wood imports

Tropical raw wood imports in 1998 were 3.36 million m^3, 57% of the amount from the previous year and 13% of the 1973 peak. By place of origin, 2.21 million m^3 came from Malaysia, 1.02 million m^3 from Papua New Guinea and the Solomon Islands, and 0.13 million from Africa. Raw wood occupied 23% of all imported wood (14.70 million m^3) in 1998.

b) The change from raw wood imports to processed wood imports (See Table 6-2)

The leading import items are changing from raw wood to processed wood. Especially, it can be said that the decade from 1985 was a period of dramatic changes. The share of processed wood products in the total amount of imported wood increased from 12% to 42%, and of this amount imports from Canada and the United States increased from 26% to 53%. Tropical wood increased from 8% to 48%. Due to the increase in plywood imports, it has multiplied fifteen fold in ten

Table 6-2 Proportion of Raw Wood and Processed Wood

		Raw wood	Lumber	Plywood	Processed wood (b+c)	Total	Percentage of Processed wood
Timber imported	1985	8,993	3,116	24	3,140	12,133	26%
from US and Canada	1990	10,548	5,722	60	5,782	16,330	35%
	1995	6,935	7,371	303	7,674	14,609	53%
Tropical Timber	1985	13,001	922	262	1,184	14,185	8%
	1990	11,101	1,274	2,805	4,079	15,180	27%
	1995	5,925	1,330	4,050	5,380	11,305	48%
Imported Timber	1985	28,312	4,417	286	4,703	37,718	12%
total	1990	28,029	7,879	2,868	10,747	38,776	28%
	1995	21,135	10,729	4,394	15,123	36,258	42%

Source: Japan Lumber Import Association materials.

years. Due to increasing imports, the plywood share in the Japanese market was 54% in 1998.

c) Changes in the situation of tropical wood producing areas

Each producing country is taking measures to promote wood product industry, aiming for an increase in the added value of its exports and also for better employment. In particular, Indonesia has become the top producer of plywood in the world due to the governmental efforts to foster plywood production as one of the key industries through subsidy policy and policy guidance. With respect to marketing, the Indonesian Plywood Industry (APKINDO), firmly established throughout the world, is a powerful monopolistic

sales network with exclusive import representatives in each country. In Japan, this system was called the APKINDO or NIPINDO system. The APKINDO monopolistic system totally collapsed following IMF advice of January 1998 and the government changes of May 1998, with the end result being that the plywood trade is now liberalized.

The role played by Japanese general trading companies in the international timber trade has become small, and the advantages of this business have disappeared. This is due in part to: the extinction of the pattern of importing resources developed abroad after the Indonesian ban on raw wood export, the monopolistic APKINDO system, and the development of local capital and of marketing efforts by local producers, in Malaysia for example. The past ten years have also seen shrinkage in the Southern Sea Wood Departments of trading companies. The era of prosperity in the entire wood trade industry has vanished. Hereafter mainstream of the wood imports is expected to be products aimed primarily at end consumers and of chips from trees planted overseas for paper manufacturing.

6.5 Environmental activities in industries related to wood imports

Responses are necessary at all levels, from natural resources to manufacturing processes and final products if efforts are to be made for the environment. I would like to deal in this part with efforts being made in the fields of imports, processing and technical development.

(1) The background - centering around 1990

From the second half of the 80's, the campaign against tropical deforestation led by European and American environment conservation groups became very active, and our country, one of the main importers, in particular importing trading companies, were under severe criticism. In Japan too, the campaign against tropical wood imports initiated for example by the Japan Tropical Forests Action Network (JATAN) became active from the second half of the 80's. Also, local governing bodies and construction companies began to decrease their use of concrete panels containing tropical wood as a component.

Facing such actions from environment conservation groups and users, countries like Malaysia and Indonesia, which had made tropical wood products their main exports, had great fears that it could become a barrier to their international trade, and started to review their forestry policy. At the international level, positive efforts began, mainly by the International Tropical Timber Organization (ITTO).

During the 9th ITTO Board of Directors Meeting, in November 1991, "internationally traded tropical timber should be sourced from sustainably managed forests by the year 2000" was adopted as an " The Year 2000 Objective ". After this "The Year 2000 Objective", it was also specified in the text of the International Tropical Timber Agreement (ITTA, 1994) that became effective in

January 1997.

In our country, at the "Meetings Concerning the Tropical Forest Problem" (a private counseling body of Director General of the Forestry Agency), an intermediate report was produced in May 1990.

The text featured as a principle for tropical wood trade, the target that trade in wood be of material produced from forest with reasonable control that allows for the durable development of tropical wood[10].

During the 10th ITTO Board of Directors Meeting of May 1991, our country proposed the "Three Principles of Tropical Timber Trade" (tropical timber trade monitoring, added value improvement, and consumption streamlining).

In this way, we can say that the year 1990 was a turning point for tropical forest issues, both domestically and internationally. It was a period when big trading companies set up global environment sections and began full efforts regarding environmental issues, and the tropical wood issue can be seen as one of their motives.

(2) Environmental efforts by the Japanese Lumber Importers Association

In November 1991, this association drew up voluntary guidelines concerning mainly the tropical wood import business and demanded that its members observe them. As for guides, there are 5 articles, but the second is the most important. It states that, "For materials that are the object of contracts, while working to ensure the securing of production that follows wood logging standards based on ITTO guidelines, observance of the voluntary guidelines will be strongly demanded of producers with which there are constant business relations".

These voluntary guidelines were also declared at the November 1991 ITTO Board of Directors Meeting, as a show of support by Japanese Government of such thinking. The Japanese government has also made it an element of the country's policy to reach the "Objective for the year 2000"[11]. Consequently, these voluntary guidelines can also be interpreted as a commitment towards ITTO.

Now, in industry, people know that the contents of these guidelines are few, and they perhaps may be seen as mere scraps of paper. The Importers Association should ask its members to observe it, even with regards to the fulfillment of the "Objective for the year 2000" that should be very close. In order to contribute to the ITTO activities, the Importers Association gave 70 million yen to it between 1989 and 1997.

(3) Efforts by the Japanese Plywood Manufacturers Association (Nichigoren)

In May 1991, the association decided on basic guidelines related to plywood material conversion. It was planning to convert 30% of plywood material from tropical wood to other material such as conifer wood within five years. Also, concerning material conversion perspectives in the long term (ten years), it is planning that by the year 2001 the majority of materials used will come from New Zealand radiata pine and Japanese larch and cedar. By the end of 1990,

factories even partially using conifers numbered eleven, and besides them it cannot be said that the production process is stabilized. The fear that production costs could rise by about 30% in comparison to production costs with the use of tropical wood has also been expressed[12]. It can be thought that if conversion has been agreed to, in spite of the fact that there are many unstable materials, it is because of the awareness of the importance of the issue of the tropical forest environment. It can also be thought that this willingness is indicative of the desire to avoid the material risk of a tropical wood resource decrease. Objectives have almost been reached in the space of five years largely due to the technical developments of industry and all-out marketing efforts.

(4) The Research Association for Reforestation of Tropical Forest

In our country international cooperation in the forestry field has until now been mainly promoted by the government, but it has been thought that it would be an effective method to make use of private activities in tropical forest conservation and technological cooperation for tropical forest conservation and reforestation. Using the strength of private enterprises that have abundant experience in tropical forest management and reforestation, a research association has been established as a promoting body with the cooperation of industry, academia and government officials. The Research Association for Reforestation of Tropical Forest (RETROF) was established in July 1991 under the jurisdiction of the Forestry Agency with ten companies joining it on the basis of the Mining and Manufacturing Technical Research Association Law. The research association system is based on the model of research association systems that appeared in Great Britain in 1917, and it can be said that the use of this system in our country to reforest tropical forests is unique, even on an international level.

The establishment of the RETROF gives a great impetus to companies' Reforestation activities in tropical zones, and plays an important role in the promotion of future research activities. The RETROF maintains four research themes, but among them, the development of a social forestry system is one of great importance. From 1996 the RETROF will enter its second period, and eight companies of the likes of Sumitomo Forestry Co., Oji Paper Co. and Toyota Motor Co. are promoting active research programs. The four research themes are as follows:

1. Development of Nursing Techniques for Fast Growing Tropical Tree Species
2. Development of Silvicultural Techniques for Tropical Forests
3. Development of Social Forestry Systems
4. Development of Utilization Techniques for Forest Products

6.6 Overseas reforestation by Japanese companies

Overseas reforestation by Japanese companies is being considered for different objectives. There is reforestation in order to secure construction material resources

and paper material resources by the wood and paper manufacturing industries, and voluntary reforestation as an international contribution. Recently there has been planting motivated by the objectives of common practice and emission trade through the planting of CO_2 absorbing trees.

(1) Paper manufacturing industry

Judging that from the environmental point of view as well as from the natural resources point of view, securing raw material from overseas natural forest is difficult, Japanese paper manufacturing industry has promoted reforestation. The cost advantages of reforestation overseas rather than in Japan has been considered from the business point of view. The reforestation area by paper manufacturing companies at the end of 1996 was 190,000 ha, with an objective of 400,000 ha. Among these reforestation undertakings, many are common projects initiated at the beginning of the 90's with trading companies and have concentrated in Chile, New Zealand, and Australia. The species are mainly Eucalyptus and Acacia.

In order to promote further overseas planting activities, an Industrial Reforestation Center focusing on the paper manufacturing industry was established in June 1996 with 48 companies as official members.

(2) Overseas reforestation as contribution for global environment

The Experimental Project for Reforestation of Tropical Forest conducted in Eastern Kalimantan (Borneo), Indonesia by Sumitomo Forestry Co., Ltd. is representative. Establishing a 3,000 ha experimental forest, its aim is technological cooperation and technological development in order to restore the forest as closely as possible to its original ecosystem of fields burned by forest fire and local slash and burn farming. Begun in 1991, it promotes experimental tree planting mainly indigenous dipterocarp trees, as well as social forestry efforts to rebuild a forest by participation of slash and burn farmers. This project is conducted in cooperation with the Indonesian Government, a local company (KTI), University of Tokyo and the research association mentioned above. It has been highly valued as an example of environmental technological cooperation from private companies.

With respect to other examples of global environment contributions, projects on oversea reforestation cooperation by Mitsubishi Corporation and Nippon Life Insurance Corporation can be cited. Furthermore, other industries such as automobile industries and electric power industries are launching into reforestation projects in recent years. Those projects are expected to contribute to CO_2 absorption.

6.7 Conclusion

Japan depends on foreign countries for numerous natural resources. With regard to primary sector product imports, it cannot be denied that consideration of the environment and environmental guidance was lacked. Therefore, there is a need to question when the problem was realized and how the response of the industry has been like. This chapter has focused on tropical timber imports in

Japan. This conclusion tries to consider the problem from the viewpoint of environmental governance.

Up to the first half of the 80's, the viewpoint of natural resource governance was dominant in forestry. Then, from 1985 to 1990, environmental governance was introduced little by little in natural resource governance. It can be said that when the 90's began, the perspective of environmental governance was apparenly taken into account in forestry at last.

In former times, there were two major groups in opposition in the governance structure in terms of forestry: citizens groups (NGOs) opposing tropical lumber imports and the importing industry. Although there have been dialogues between them, opinions on both sides were mainly declarative and did not demonstrate a positive attitude geared towards the resolution of problems. Nevertheless, the NGO's domestic and international activities have certainly influenced big trading companies. Some companies have begun activities for global environment with the tropical forest issue as a starting point. Also, an increasing number of companies have withdrawn from business related to tropical forests and the imports. The likely reasons for their withdrawal has been not business-like aspect of the trade but the fear that the opposition of NGO's may affect their image, and probably few companies have given serious consideration on environmental governance point of view.

It was around the 1992 UNCED that industry began to think seriously about environmental issues and started making concerted efforts, considering the environment as an important matter in the business field. The Japan Federation of Economic Organizations' (Keidanren) Charter for Global Environment played the role of pressing companies to cope with the problem. Nevertheless, it is difficult to say whether concrete efforts are spreading in the industry, and the wood industry response was slow.

The logging ban to protect the American West Coast Spotted Owl problem and the march 1993 "Timber Summit" organized by President Clinton to solve it, had a great influence on our country's forestry and wood industry. The awareness deepened in industry that business without taking into account environmental issues was no longer possible.

Also, exchanges with American environment conservation groups like The Nature Conservancy (TNC) and Conservation International (CI), through the activities of the Nature Conservation Fund, offer a reference. TNC acts on the basis of three principles: "Non-confrontation approach," "Science oriented approach" and "Partnership centered"[13]. Forestry is deeply linked to the environment and opposition by nature conservation groups is common. This is the case in our country's wood trade too, and because the TNC action principles provide a common ground for industry and NGO efforts, they serve as a reference. Moreover, they give many hints when considering companies' environmental governance.

As for the future of Japanese wood supply-demand, looking at it from the

point of view of the international competitiveness of Japanese forestry and wood industry, it is unthinkable for a while that the self-sufficiency rate will increase, and we will probably be forced to rely on imports. Consequently, the environmental governance of companies relating to imports will still be of great importance.

Forest fulfil environmental preservation functions as well as economic functions, as wood production brings economic value for example. Maintaining a good balance between these two functions in the utilization of natural resources is very important. Japan is globally dependent for lumber and paper manufacturing material and must think about a reasonable use of forest resources with a global vision. Raising forest resources for consumption is a basic idea, but for companies it is a matter that may lead to questions about their environmental governance. In this regard, I would like to think about present responses and responses in the long term are as follows.

First of all, as for imports, importing companies have to consider giving priority to imports of lumber and paper manufacturing material produced in forests where sustainable forest management is carried out. For tropical forests, that means the observance of ITTO's "Objective for the Year 2000". More concretely, concerning imports from developed countries; priority should be given to material from forests that have earned certifications like ISO 14001 and FSC. For developing countries, and particularly for numerous countries of the tropical zone, forestry and the forest industry are important industries, and forest products are a major export. Therefore, creating trade barriers in response to environmental issues cannot be a positive solution. When importing from countries that produce tropical timber, while expecting the observance of the ITTO's "Objective for the Year 2000", the governments and companies of importing countries should probably promote technical support in order to acquire certifications like ISO 14001 and FSC.

The promotion of overseas reforestation is the long term response by our country's companies that have as a principle the raising and use of forest resource. Japan, a country dependent on imports for its natural resources, should probably move from a pattern of importing natural resources developed abroad to a pattern of importing resources grown abroad.

Of course, it is no use saying that we must not only depend on overseas countries, but also the domestic administration and the private sector must cope together for Japan's forest resource use.

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7. Environmental Governance and Electric/Electronics Industries - ISO 14001 -

7. 1 Introduction

The number of ISO 14001 acquisitions in Japan at the end of December 1998 was 1,542, which was the world's highest rate and which reflects a remarkable increase. For a while after ISO 14001 was issued, mainly leading Japanese electric manufacturers held most of the acquisitions by companies but the movement toward acquisition has spread widely into other fields now. These fields are not only industries such as construction companies, retail dealers and service businesses but also non-industry fields such as local governments and smaller businesses. It is not too much to say that the acquisition of ISO 14001 for the purpose of environmentalism is booming.

As regards interpretation of strategies for ISO 14001 by the electric and electronics industries, which hold close to a majority of acquisitions and were the instigators of the acquisition boom, this report surveys the issue, giving background, details and the situation until the industry made the decision to acquire certification. In addition, examination of future expansion and the meaning of ISO for environmental problem solutions is given from the point of view of environmental governance.

7. 2 The state of acquisition of ISO 14001 certification

According to Figure 7-1, the acquisition of ISO14001, which were first issued in September 1996, has reached 900 this year alone. It is concluded, therefore, that according to the ISO acquisition number of more than 1,500, which had been reached by the end of December 1998 in Japan, as mentioned above, the movement toward acquisition had increased as time went by.

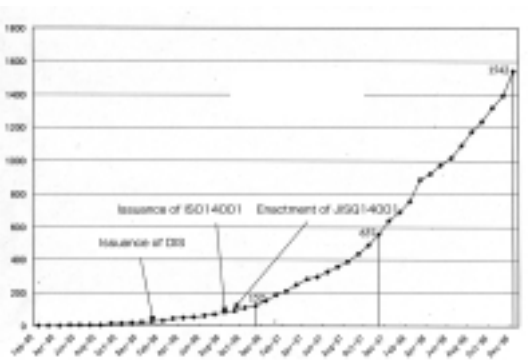

Figure 7-1 Total Number of ISO14001 Registered Companies (As of December, 1998)

Japan, which is in the top position according to number of acquisitions, occupies approximately twenty percent of the world ISO 14001 acquisition number which is a little fewer than 8,000. Germany is in second place with 1,100 acquisitions but Germany is substantively in first position because it has acquired 1,795 EMAS separately. The third position is held by the United Kingdom with 950, then the ranking goes

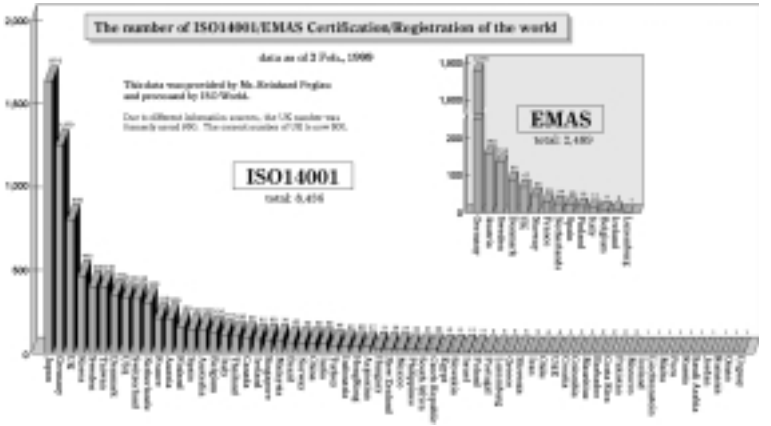

Figure 7-2 The Number of ISOI14001 Certification of the World (As of January 1, 1999)

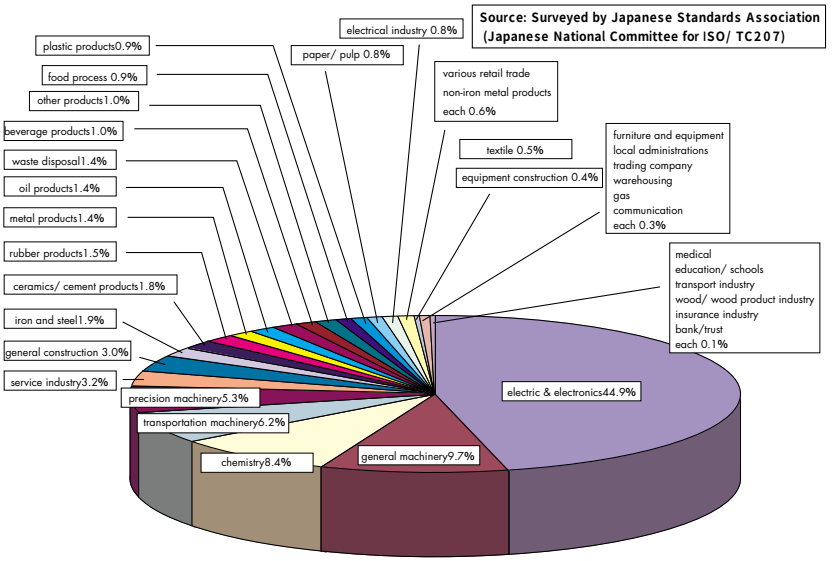

Figure 7-3 Current Status of ISO14001 Certified Industry Analysis of Japan (As of December 1999)

down to Korea with 463, Sweden with 400 and Taiwan with 398. Incidentally, the number of acquisitions in the U.S.A. is 210. Concern for acquisition of ISO by U.S. entities is apparently not high (See Figure 7-2).

The number of acquisitions in different types of businesses is as follows. Acquisition by the electric machinery industry dropped 5% in the last six months to 45%. If the four major industries other than the electric industry, such as general machinery, chemical industry, precision machinery and transport machinery, are included, the number dropped 5.2% to 74.5%. Acquisition by businesses used to be restricted within a narrow range but it is obvious that acquisition of ISO 14001 has expanded into various businesses according to data analysis. Industries where the acquisition rate is growing at present are the chemical industry, transport machinery, service businesses and the construction industry. In particular, the growth rate in the construction industry rapidly increased from 0.9% to 3%. The rate of installation businesses and trading companies is low, but the number has doubled and transportation companies, universities and finance-related companies are marking record acquisitions as newcomers (See Figure 7-3).

7.3 Distinctive features of electric/electronics industry and countermeasures for the environment

In this section, historical changes in this industry toward the establishment of countermeasures for the environment are described. These changes have specific meaning for understanding the background of the positive attitude toward acquisition of ISO 14001 in this industry.

(1) Distinctive features of the electric/electronics industry

The total production by electric and electronics entities in 1997 was approximately 26 trillion yen and the number of employees reached approximately 430,000. This industry has become a major industry like the transport industry. Twenty-two years ago, in 1977, the total production by this industry was 6 trillion yen, meaning that the industry has quadrupled in the last 20 years. In this connection, the growth of Japan's GDP in this term doubled. The growth rate has dropped since 1990 but competition is quite severe because there is still the possibility of more growth toward the 21st century. Distinctive features are summed up as follows.

i) Company image is important, especially for final products for private use, and each company is investing heavily in advertisement to heighten its images. Regarding the establishment of countermeasures for pollution and environmental problems, companies have been extra careful not to damage their image.

ii) Global business expansion is essential because the export rate accounts for nearly half the total production amount and production abroad is also increasing. According to the data from 1996, the number of companies in foreign countries was 1,144 (767 companies in Asia are included) and the total number of employees was 800,000 (60,000 in Asia). Both are far and away higher than domestic numbers.

Table7-1 Change of Environmental Issue Countermeasures in Electric/ Electronics Industry

	1970 <First Term> 1985	<Second Term> 1995	<Third Term> present
Chronological timetable on Related Matters	'70 Pollution Conference in the National Diet '75 PCBRegulations '73 First oil shock '79 Second oil shock	'89 Trichloroethylene etc. regulation '91 Keidanren Global Environment Charter '91 Law for the Promotion of Utilization of Recyclable Resources '92 Voluntary Plan '93 Basic Environment Law '87 Montreal Protocol '89 Valdez Incident '92 Earth Summit '93 ISO／TC207 '93 Energy Star Programm	96' Keidanren Appeal on Environment 96' Green Purchase Network 97' Law for Promotion of Sorted Collection and Recycling of Containers and Packaging 98' Waste Electronics Law 96' Issuance of ISO14001 97' COP3 Conference in Kyoto
Distinctive features	Response to pollution control regulations, and infrastructure preparation	Establishment of organizations, systems and EMS, as a response to apparent emergence of global environmental problems	Expansion of activities for global environmental protection and voluntary activities (targeting overall company operation range)
Principal activities	・Countermeasures for air/water pollution, improvement of safety and hygiene, and workshops ・Introduction of elementary environmental audit systems (Hitachi, NEC, etc.) ・Post-oil shock energy saving countermeasures for factories ・Promotion of harmony with local communities and factory greenery	・Total phase-out of chlorofluorocarbons (CFCs) as a countermeasure for protection of the ozone layer (earlier than planned) ・Strengthening of organizations/ systems for global environmental conservation ・Enactment of environmental charter(s) and action plan ・Adoption and announcement of environmental voluntary plan→waste reduction, resource recycling, etc. ・Preparation for ISO14001 acquisition→EMS reconstruction and introduction of systematic environmental audits ・Establishment of JACO (Japan Audit and Certification Organization for Environment)	・Concentration on acquisition of ISO14001 certification (completed at domestic production factories in '98→related companies/companies abroad) ・Countermeasure consultation for zero-emissions and resource recycling ・Multi-faceted consultation for countermeasures for global warming ・Consideration of environment for products, waste products recycling→Introduction of Life Cycle Assessment, response to Green Purchase ・Information Disclosure→ publication of environmental reports, environmental advertisement and information on the internet

Author

Therefore, industry leaders are extremely sensitive to conditions and tendency in foreign countries.

iii) Companies that use intensive labor such as product assembly are the majority in the industry. Therefore, management systems such as TQC and TQM were introduced to achieve overall company activation and improve product quality initially. They have become firmly infiltrated into the companies. There was argument about examination of introduction of ISO 9000 and ISO 14001, but introduction was decided on due to the success of this basic concept.

iv) Competition over technology and new product development is severe among companies but new management systems and know-how, etc. are shared mutually. Consequently, there are not a few cases where this has led to there being no differences between companies in management and products.

(2) Countermeasures for environmental problems in electric/electronics industry

Three factors, such as a chronological table, distinctive features and major activities are shown as follows. They provide easy understanding of the stream of history and the changes of establishment of concepts and countermeasures for environmental problems. I would like to add some supplementation as follows (See Table 7-1).

i) The first term: 1970 - 1985

Every leading company had planned some sort of systemization based on the main purpose of dealing with pollution prevention since the beginning of the 1970's because of the influence of arguments about pollution problems in the National Diet in 1970. Names are diverse, such as "Pollution Prevention Division", "Environmental Administration Division for Pollution Protection", "Environmental

Administration Institute" or "Environmental Preparation Promotion Center", but fundamental preparations for environmental administration, such as establishment of technology centers and institutes and the introduction of elemental environment inspection systems, were planned during this term.

Also during this term, countermeasure for energy saving had progressed particularly in factories due to the experiences of the two oil shock crises and the consequent know-how accumulated.

ii) The second term: 1985 - 1995

Destruction of the global environment, such as ozone layer destruction and global warming, began to be recognized in the middle 1980's and the opportunity for the industry to become aware of these problems arose during the term when the "Montreal Protocol" was adopted. After the establishment, a countermeasures for Freon gas committee was established by each company and they worked in union to examine countermeasures for a total ban on Freon. In this industry, most companies cleared the regulations of the Montreal Protocol during this term because the industry gave first priority to establishing countermeasures for the solution of the Freon problem.

Also during this term, the items addressed in the "Charter of the Earth Environment" by the Federation of Economic Organizations (FEO) and the start of ISO / TC207 in about 1992, when the earth summit meeting was held, stimulated each company in this industry to become enthusiastic about solutions to environmental problems. Major and obvious changes in the industry's attitude toward solutions to pollution problems such as preparedness of organizations and systems, reconsideration of EMS, enactment of environmental charters and operational guidelines and preparation for the acquisition of ISO 14001 certification, were carried during this term.

This term is also considered to be the starting point of the positive movement by companies toward the solution of environmental problems because they started recognizing both limitations of earth resources and dangers to human existence. This was not based on the usual passive attitude of following regulation but on a view encompassing global environmental problems to expand their activity targets.

iii) The third term: 1995 - present

Each leading company that accumulated know-how through the experience of acquisition of BS 7750 in 1995 competed with others to acquire ISO 14001 when it was officially issued in 1996 and acquisitions have increased rapidly. Major factories of each company had acquired certification within less than two years.

Due to the mixture of influences by the "Environment Appeal" by the Japan Federation of Economic Organications, the 1997 Conference of the Parties to the United Nations Framework Convention on Climate Change in Kyoto (COP3), green purchasing and product recycling laws, strategy targets for the solution of environmental problems by each company were focussed on "product recycling".

These were measures of consideration of environment protection, which means that companies should take overall responsibility for their own products, or in other words each company is targeting the entire range of its business.

Consequently, "consideration of the environment" became one of the policies that support management strategies in the industry. It led to competition among companies shifting to a new stage with consideration of environmental products and the establishment of recycling systems and an image of being "companies which care about the environment". The present situation in each company is that there is an obligation to take a positive attitude toward consideration of the environment regardless of the company's preference.

7.4 Approaches for ISO 14001 in electric/electronics industry

(1) Changes in number: Acquisition of ISO14001 certification

From about 1993, when international EMS came under examination in ISO / TC207, major leading companies began to examine genuine EMS, to introduce environment inspection systems and to promote a movement to change current systems in accordance with international standards. Acquisition of BS 7750, which was issued before ISO 14001 starting from 1995, by more than 10 businesses, was involved in these movements. It could be concluded that JACO (Japan Audit and Certification Organization for Environment), which is described later, had accumulated actual experience and know-how to become a certification body during this time. There is no doubt that each company accelerated its activities based on these experiences and know-how to acquire ISO 14001 certification after it was officially issued (See Figure 7-4).

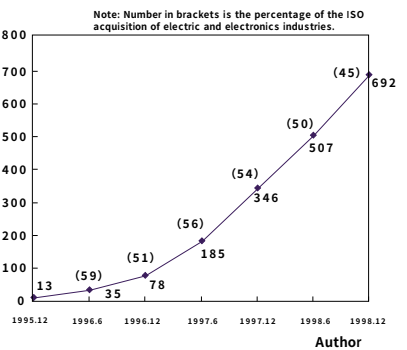

Figure7-4 Changes in the Number of the ISO14001 Acquisition of Electric and Electronics Industries

Domestic production facilities that are directly controlled by major leading companies had mostly completed the acquisition of ISO 14001 within two years after its issue and each company has given priority to certification acquisition by foreign production facilities and business-related companies. Each company also is recommending or expecting its customers to acquire the certification and it is said that nearly 300 companies that are related to a certain enterprise are preparing for acquisition.

(2) Aim of ISO 14001 introduction

As mentioned previously, each company in this industry has a history of

activities for environmental preservation over the years and has its own environmental administration systems. Performance has improved continuously such as reduction and reuse of waste, energy saving and proper administration of chemical substances, etc. Explanation of why the industry took the initiative in introducing ISO 14001 even though improvement had been carried out is given as follows.

i) Within the mainstream movement toward consideration of global environmental problems, it is natural for the industry, with its aim to expand its business on a global scale, to change its original EMS in accordance with international standard EMS when it is issued. Each company could have judged that certification acquisition would have been unavoidable because of the influence of business shifting to cherishing the environment within the EU market. Another influence was awareness that companies such as Siemens, Nokia and Erikson would stipulate certification acquisition in purchase conditions.

ii) It is possible to judge that Japan had the bitter experience of being severely criticized as "tone-deaf in standardization" when Japanese companies did not respond quickly to issue of ISO 9000; the first acquisition was three years after its issue. Japanese entities did not want to find themselves in that position again so each company set an example by acquiring environmental ISO.

iii) The industry must have expected to improve system levels and to pour fresh ideas into their activities by deciding to change the usual environmental administration activity in accordance with the international standard EMS with the intention of passing third person evaluation.

iv) Also, each company, which regards image as important, could have expected to heighten its image by acquisition of environmental ISO because awareness of environmental problems by consumers began to grow during this term, even though it was a minor movement.

(3) Background and factors of rapid ISO 14001 diffusion

As mentioned, the number of acquisitions by the industry has reached 700, which means that the task for the industry could be certification acquisition by companies in foreign countries and business-related companies. Leading companies' enthusiasm for acquisition has cooled because acquisition has spread throughout the industry as this number indicates. This being the situation, however, the reasons for the background and the factors leading to rapid acquisition expansion are given as follows.

i) Each company in this industry had more than two decades history of experience with environmental preservation activities starting from the age of efforts for environment countermeasures. Certain environmental management systems had been constructed through this experience. Therefore there are environment-related capable employees in each company now. Each company was also familiar with the "PLAN-DO-CHECK-ACTION" management cycle due to diffusion of TQC/TQM activities within companies. Each company was able to respond to the preparation for ISO 14001 certification acquisition within a relatively short time

due to the unpleasant experience of ISO 9000.

ii) Each company established full-time divisions and project teams aiming at ISO 14001 certification acquisition. Centralized know-how that had been absorbed through these teams was infiltrated into the company. It could be concluded that acquisition rapidly progressed because of the following reasons: a clear period of acquisition was established, examination of goal achievement was given, awareness of executives and their intention not to be overtaken by their competitors.

iii) To proceed with an efficient and economical certification acquisition strategy, the industry established JACO with the cooperation of the ten major companies and industrial-related bodies. Consequently, it could be said that the creation of JACO gave impetus for establishment of acquisition strategies. In other words, certification systems already existed in each company through which the company invested both work hours and money, therefore, to prevent financial waste and to educate the workers, there was no choice but for each company to proceed with certification acquisition after all.

(4) Change and merit of ISO 14001 certification acquisition

This industry does not have an overall evaluation and data about certification acquisition, but the collected voices and opinions of related parties are as follows.

i) Awareness and understanding of the environment among the company executives and ordinary employees has grown. Formerly, only environment-related people and minor groups were concerned about the environment, however, it seems that this concern has spread into each company much more than before through the process of environmental ISO education and preparation for its introduction. The number of specialists in environmental problem countermeasures is also increasing rapidly because each company has carried out positive education of inspection personnel required inside the company.

ii) ISO 14001 acquisition has become a passport for customers and markets. Companies with acquisition were more highly evaluated by local governments and regional societies and the record of acquisition is useful when a company purchases CDMs or has to answer questions from business connections such as what kind of activities or consideration are given to the environment. Since ISO 14001 is an international standard, acquisition removes barriers to international trading.

iii) The range of activities for environment preservation by each company has surely expanded as awareness of the environment has grown in general. Examples include initiation of "green purchasing" (government offices and companies purchase products and raw material which are less demanding on the environment, these products are called Green Products), serious examination of waste product recycling and introduction of LCA. It could be concluded that companies have shifted their operational activities from being mainly based on the production process to aiming at the entire product life cycle.

iv) Since preparation and accumulation of data have progressed due to EMS efficiency diffusion, each company began to publicize its operational activities through environmental reports and the Internet as means of positive information diffusion. Freedom of information is now a social requirement. It is going to accelerate more and more in the future for promotion and image improvement of companies.

v) There are no data regarding economic efficiency and cost effectiveness but detailed reconsideration of facilities and facility administration is progressing. This includes reduction of lighting, temperature settings for vending machines, cogeneration and introduction of energy saving office automation appliances in order to further reduce the environmental burden. The economic effectiveness of these measures will increase gradually. This reconsideration was instigated even before ISO was introduced, but it will progress more rapidly in the future. Since examination of environmental costs and environmental accounts has started as the next step, economic efficiency and cost effectiveness will be more clear in the future than at present.

7.5 Present and future expansion of ISO 14001 acquisition in Japan

As examined in "7.2", the number of ISO 14001 certification acquisitions is not only increasing year by year but also spreading among different businesses. It is not too much to say that the attitude is totally different from when manufacturers were deeply involved in export businesses and tried to cope with acquisition. It seems that there are various backgrounds and views to the acquisition in each type of business or company, however, there are various factors that drive these companies to acquire the certification. For small and medium-sized enterprises, one factor is influences by the parent corporation's intentions and green purchasing introduction by major users. In the construction industry, there is a high possibility that acquisition may be one of the tender conditions for public facility construction. If acquisition by contract suppliers increases, a construction company that does not have ISO 14001 acquisition might be rejected when it applies for contracts. These factors are a threat to them. There are, of course, more than a few other factors leading to acquisition such as awareness of environmental protection by company executives, improvement of company image and advertisement of company attitude as being concerned with environmental problem solutions.

In particular, it is not hard to imagine that the number of acquisitions by local governments might rapidly increase in the future. It is also assumable that the movement toward green purchasing will spread into other areas that were stimulated by local government acquisition and this movement will give more impetus to the environmental ISO boom. More description of this matter follows.

(1) Acquisition of environmental ISO by local governments and its influence

Shirai Town in Chiba Prefecture and Joetsu City in Niigata Prefecture took the early initiative for ISO 14001 acquisition. Analysis of the movement toward

environmental ISO acquisition in local governments indicates an environmental boom by local governments because more than 50 local governments have declared acquisition. There are indications that several hundred local governments have started preparations for acquisition.

Why is it necessary for a local government to acquire ISO 14001 certification? Observation of Joetsu City and Osaka Prefecture (in preparation) shows an intention not only to appeal to residents and aiming at image improvement but also improvement of organization management and activation. Joetsu City's first goal is "Progress in building our town: care for the environment". Osaka Prefecture's aims are as follows.

i) Reduction of environmental load (reduction of resources / energy)

ii) Reformation of government officers' awareness

iii) Consideration of the environment in public businesses (regulations in procurement / bidding / written contracts)

iv) Improvement of organization transparency

v) Ripple effect on Prefecture residents / corporations (issue of Prefectural Office environmental reports)

Most local governments already have support programs regarding ISO acquisition such as seminars and short courses, consultant dispatch and financing and assistance for acquisition expenses. Local governments are showing a positive attitude toward certification acquisition in these ways. If local governments themselves acquire certification, it may be inevitable for them to offer guidance and to request for certification acquisition of their clients. They could push companies to consider the environment when considering procurement and bidding.

(2) Green purchasing expansion and its influences

The movement toward green purchasing in local governments is expanding into other government offices such as Shiga Prefecture, which won the first "Green Purchase Award". This kind of tendency is related to the increasing tendency toward environmental ISO certification acquisitions by private companies. A major appliance manufacturer which had acquired ISO14001 earlier than other companies started examining green purchasing as one of its management themes and is issuing guidelines one after the other for its business partners.

Among many companies that have positive intentions toward green purchasing, NTT group is quite aggressive. NTT group has been evaluated as being positive toward environmental protection in their products and company attitude. In regard to attitude, in order to be equivalent at the achievement of an environmental management system, the ISO 14001 acquisition is required to companies as the standard to evaluate its efforts.

The movement toward green purchasing could be a companion to environmental ISO 14001. In another words, diffusion of ISO stimulates the

expansion of green purchasing and after green purchasing has expanded, the necessity for ISO is produced in companies. The movement toward green purchasing and spate of ISO 14001 acquisitions will greatly increase due to this synergistic effect and it can be assumed that both will be great trends in the future.

7.6 Significance of ISO 14000 and environmental governance

According to analysis of the meaning and role of environmental ISO, there seem to be two points of view. One is the attitude once acquisition is completed; no further action is required because ISO certification is only a short-term passport for environmentalism. In this case, expenses for environmental improvement by a company will consequently be expensive. The other attitude is that the position of ISO introduction is a management tool, which is useful for shifting company management toward consideration of the environment with a long-term point of view. In this case, acquisition itself is just a step toward the future, because it is possible for a company to improve cost effectiveness for sustainable environmental problem solutions. When the decision to introduce ISO is made this way it will be highly effective.

(1) ISO 14000: its ingenious mechanism and possible development

ISO is planned quite ingeniously since it was produced after the earth summit, which aimed at sustainable development. It consists of subjects from EMS establishment involving company executives in systems for sustainable improvement and performance (ISO 14030). Plus, it includes a label (ISO 14020) and LCA (ISO 14040), which means that ISO was planned with a wide and long-term view. The more a company is observant of ISO regulations, the deeper strategies toward environmental consideration can go. Consequently, the effects of ISO acquisition could be phenomenal.

(2) Effectiveness in organizations searching for environmental countermeasures without EMS

There is presently an atmosphere of high awareness of solution to global environmental problems. Most likely, companies that wanted to establish countermeasures for solutions would not have been able to determine how to start nor what view they should take if ISO 14001 had not been issued. The ISO could be viewed as a "guidepost" for those companies to plan solution measures systematically and continuously. It is understandable that many local governments are examining the possibility of acquisition.

(3) Promotion of independent and voluntary activities is more effective than regulations

Laws and regulations, which take effect at once, could work better to solve problems that have clear causes such as pollution, but independent activities which take place beyond regulations might be more effective in solving wide range problems arising from complicated ecological system like the global environment. Deep understanding of environmental problems should be connected to

consideration of the realities of past economic conditions. This should stimulate, for example, a change of the social system to the circulation type. The environmental ISO will become a detonator and driving force to change companies and administration. It has the possibility to change consumers' lifestyles.

(5) Expectations for the effects of environmental ISO

Leading companies with ISO 14001 acquisition have started providing free access to information about their performances with environmental problem countermeasures, such as detailed activities, results and data, etc., through environment reports and homepages. Companies and local governments that have acquired ISO are undertaking these activities and even companies without acquisition such as Ito Yoka Do (supremarket) are likely to go the same route in the future. Information spread in these ways will expand into many other companies in the future, so it is consequently likely that sending information in these ways will improve the level of environmental countermeasures throughout society as a mutual effect.

As examination of ISO certification was given in this report, it could be said that ISO 14000 is a good model for environmental governance. It is a social system and plan that does not depend on regulations, yet requires companies and local governments to independently participate in planning and operations. The more companies and organizations take part in these activities, the more experience and know-how can be accumulated and, consequently, the more understanding of the environment will progress. A good circulation pattern is likely. The green purchasing movement is close to this pattern and, as mentioned above, green purchasing can be anticipated because of the mutual influences of ISO.

7.7 Conclusion

As the limitations of economic prosperity have started coming to the surface and serious global environmental problems have now became obvious, the next goal is clear. There will not be a prosperous 21st century unless a circulation society, with harmony between the environment and the economy, can be constructed. It is time for Japan to cope with this theme again. A changing course towards a circulation society is needed in concert with people from nation, administrations and industries from all over the world. Environmental ISO fulfils a function to trigger the spread and activation of the circle of environmental activities year by year. The ISO acquisition in Asia has reached to 2871 (as of the end of December 1998), and further increase of the acquisition is predictable.

It is expected that environmental ISO, in harmony with various environmental activities including countermeasures for global warming, will fulfil significant functions for construction of sustainable society.

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8. Environmental Governance Problems and Business -Soil Pollution and Waste Problems-

8.1 Introduction

As described earlier, during Japan's economic development, businesses in Japan reached the top levels of global environmental governance, in part due to results achieved through the promotion of anti-pollution and environmental measures in numerous fields. Nevertheless, one has to mention the many environmental issues remaining as a negative inheritance of economic development. Among these are included, on a broader level, influences on nature and culture, for example: the destruction and decline of wild animals and plants, the disappearance of beaches and the modification of traditional and urban landscapes. With respect to businesses, pollution issues, such as the degradation of the urban living environment, must also be raised. Until now, company efforts were not intensive, and now problems posed by soil pollution and waste exist as much bigger issues that must now be resolved on a national basis. This chapter tries to consider the future environmental governance problems, while dealing with these issues.

8.2 Soil pollution problem (Including groundwater pollution problem)

(1) Present situation of urban district soil pollution in Japan

Current situation of urban soil pollution in Japan does not come easily to light. As for public data, there are the survey results published in March 1998 by the Environment Agency (1996 Soil Pollution Examples and Counter-measure Situation Survey Results Outline). According to the survey results, there is a cumulative total of 375 pollution sites (See Figure 8-1) and within that number, only 102 cases are recognized as not meeting the Environmental Standards. When the results are examined by industry classification, metal product manufacturing industries, laundries, hair dressers, public baths, chemical manufacturing, electrical machines and appliances manufacturing are

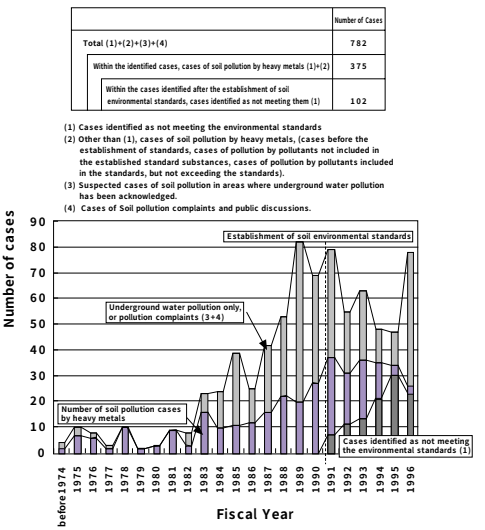


Figure 8-1 Number of Soil Pollution Cases (March 1998)

numerous (See Table 8-1).

On the other hand, in foreign countries, the numbers of pollution sites designated as not meeting their own standards exceed the level of 10, 000 (See Table 8-2). Giving consideration to these figure comparisons, it can be said that situation in Japan is really better than a lot of foreign countries. However, is there no question to speak of a negative inheritance in Japan?

Table 8-1 Cases of Soil Pollution by classified industries

Classification of Industry	Cases	%
Metal Mining Industry	3	0.8
General Construction Industry	2	0.5
Textile Industry	2	0.5
Wood and Wood Products Industry	5	1.3
Printing, Publishing and Related Industries	1	0.3
Chemical Industry	40	10.7
Oil and Coal Products Industries	2	0.5
Plastic Products Manufacturing Industry	2	0.5
Rubber Products Manufacturing Industry	2	0.5
Ceramics/Cement Products Manufacturing Industry	9	2.4
Steel Manufacturing Industry	12	3.2
Non-Metallic Products Manufacturing Industry	22	5.9
Metallic Products Manufacturing Industry	55	14.7
General Machinery and Appliances Manufacturing Industry	15	4.0
Electrical Machinery and Appliances Manufacturing Industry	39	10.4
Transportation Equipment and Appliances Manufacturing Industry	18	4.8
Precision Machinery and Appliances Manufacturing Industry	3	0.8
Weapons Manufacturing Industry	1	0.3
Electrical Industry	1	0.3
Gas industry	2	0.5
Heat industry	1	0.3
Railway Industry	2	0.5
Freight Industry	1	0.3
Construction Materials, Mining and Metallic Materials etc	4	1.1
Laundries/Hair Dressing/Baths	50	13.3
Automobile Repairing Industry	1	0.3
Other services	1	0.3
Waste Treatment Industry	7	1.9
Medical Industr	2	0.5
Educational and Research Institutions	8	2.1
Local Administrations	2	0.5
Others	60	16.0
Total	375	

Source: Environmental Agency Materials (1998)

Note: "Others" includes the pollution cases by natural causes, unspecified causes, and unspecified industries.

Basically is that the Environment Agency materials gathered only brought to light pollution cases on the basis of limited information, and do not show the whole picture of soil pollution problem in Japan. Although such pollution accidents have decreased, in manufacturing sites in the past, harmful substances leaked in the production process was disposed of as waste, directly polluting the soil. Pollution was exacerbated by the discharge of such substances into the air or water. Then, once the polluting was done, these effects accumulated in the long run because of their character. As long as clean-up measures are not taken, these effects will remain for a very long time. In this regard, it is suspected that there are numerous polluted sites in Japan, in fact, pollution has actually appeared recently in former factory sites and operating industrial areas.

Table 8-2 Soil Pollution Cases in Foreign Countries (Suspected sites)

Germany (As of October 1998)	UK (As of 1993)	
* Former industrial Sites: 112,368 * Former Waste Disposal Facilities: 90,517	* Steelworks: hundreds * Former Waste Disposal Facilities: 20, 000-25, 000 * Oil stations: 10, 000 * Gasworks: 3, 000(5, 000	* Land-area polluted: 200, 000 ha (surveyed by Industrial Union of UK)
Total 202, 885	Total 30, 000 - 40, 000	

Netherlands (As of 1997)	USA (As of 1996)
	* Polluted Sites Registered on Information System: 13, 000 (Cumulated total 40, 000) * Polluted sites registered on National Priorities List (NPL) (Sites designated for purification by the Superfund Law): 1, 244
Total 175,000	Total Federal 13, 000 + State α

Author

Also, with respect to soil and groundwater pollution that has little linkage with business activities, the pollution problem of areas surrounding waste disposal facilities remains. In landfills or in former waste disposal sites, the potential pollution problem continues to exist to a certain extent. Among such cases are examples of the development of citizen led actions, such as the pollution dispute

surrounding Tokyo Hinodecho Waste Disposal Facility.

With respect to these conditions, various estimates are made among private sectors about the situation of polluted areas. Among them, according to the recent trial calculations of a specialist, the number of soil or groundwater pollution sites in Japan reaches 12,000. Although there is a double-digit difference between the figures of the specialist and the Environment Agency Survey, the result of the specialist survey is not unconceivable if comparing them with those of other countries'.

(2) Japan's soil pollution regulations in urban districts

Setting the divergence of survey results aside, there is a need to find the factors which has caused such pollution aggravation. Therefore, the national and local governmental regulations up to the present should be reviewed firstly.

1) National regulations

In Japan, with respect to agricultural land, soil pollution regulation has enacted in 1970 when the "Agricultural Land Soil Pollution Prevention Law" was introduced. On the other hand, there is no direct laws or regulations on soil pollution control in urban districts. For this reason, harmful substance disposal and dumping on the soil continued on for a long time even after regulations of air and water quality pollution were introduced.

It can be said that the urban district soil pollution problem arose from the Tokyo Hexavalent Chromium Accident in 1975. In this accident, remains of previously buried hexavalent chromium were discovered in a former chemical factory site, and the pollution became a serious social problem. It served as the impetus for the 1976 revision of the Waste Disposal and Public Cleaning Law, setting standards for the landfill of waste. However, this was not enough to control inappropriate handling of harmful substances.

On the other hand, in the 80's, soil pollution by chlorinated organic compounds, not recognized before as harmful substances, turned out to be a problem. For this reason, Local governments were provided the provisional guidance on drainage from industries that use organic solvents containing chlorinated organic compounds by Environmental Agency, and the Ministry of International Trade and Industry also provided businesses with guidance on the appropriate handling of organic solvents. However, many of these did not work effectively, and in fact pollution problems were getting worse.

Afterwards, from the end of the 80's to the beginning of the 90's, the efforts of local governments were strengthened, with response to pollution getting more serious. The necessity of measures arising at the national level was recognized. and the following measures were gradually implemented:

- Revision of Water Pollution Control Law (1989)

  : Forbiddance of polluted water dumping on soil and instatement of

regulatory monitoring on groundwater quality

- Establishment of Environmental Quality Standards for Soil (1991, supplemented in 1994)

  : Establishment of the targets at the administrative level

- Provisional Guideline for the Surveys and Measures for Soil and Groundwater Pollution concerning Organochlorine Compounds, etc. (1994)

  : Indication of the general procedures of surveys and measures in case where ground water pollution has been confirmed

Also, the Water Pollution Control Law was revised in 1996 (enforced from April 1997), and the clean-up obligation was introduced concerning polluted groundwater.

As seen above, introduction of the regulations concerning soil and underground pollution came later than those of air and water. Although regulations on soil and underground have been improved gradually, drastic change of the situation can not be expected. Even at present, there have been no laws enacted that directly promotes the clean-up of polluted soils, and this is remained as an issue to be solved in future. It cannot be denied that the cause of the insufficiency of the responses concerning soil pollution, compared to the ones concerning air and the water system, lies in the deficiencies and shortages in such regulations. That is to say that, as seen from the governance point of view, it cannot be said that regulations have in any reasonable form been enforced at the national level to cope with the environmental issue.

2) Local governmental regulations

It has been observed that countermeasures for soil pollution, in the form of provision of outlines, guidance and further ordinances, were adopted earlier in local governments than at the national level. They can be divided roughly into the following categories.

i) Requirement to land owner companies of taking pollution countermeasures, when purchasing land for public use: Tokyo Metropolis.

ii) Providing companies with guidelines on soil pollution measures, when constructing buildings beyond a certain scale: Tokyo Metropolis, Itabashi and Edo district.

iii) Providing companies with guidance on soil pollution measures, when moving or closing their factories: Yokohama City, Kitakyushu City, Kawasaki City.

iv) Requirement companies of survey obligation and clean-up obligation if pollution problems are recognized: Kanagawa Prefecture, Hadano City.

Furthermore, guidelines are provided, when pollution problems are discovered through local surveys and when harmful substance leakage were found after accidents. It is estimated that the number of counter-measurement cases

have been taken in response to these administrative guidance by local governments.

(3) The response of business

1) Movement of voluntary actions by business

With the gradual strengthening of national and local government regulations, and with the soil / groundwater pollution becoming recognized as obvious and serious problems, voluntary clean-up efforts have begun, mainly by large-scale enterprises.

The beginning of these efforts is voluntary investigation by companies themselves. Businesses carry out such surveys not only for the suspected sites with their own waste or drainage containing pollutants targeted by environmental standards, but also for the sites in other regions that such pollutants have been detected as exceeding these standards. Furthermore, every company carries out environmental investigations for soil and groundwater as global assessments of their own environmental impact in order to acquire ISO 14001 certification. Then, measures are taken following the related environmental guidelines when pollution exceeding environmental standards are discovered. There are some manufacturing companies which have decided their principle to carry out purification operation when pollution is discovered within the sites of the companies as well as their affiliated companies sites.

Also, some companies gaining interest in this problem gathered and established the "Soil Environment Forum" for the promotion of countermeasure technologies and research activities over American and European soil / ground water pollution control systems and case studies. The forum then developed into a "Soil Environment Center," and continued on carrying out assessments and analyses of polluted sites and surrounding areas. Other areas of activity include: environmental and research control methods, technical measures and valid uses for treated soils in order to carry out effective and economic clean-up, and the provision of information and technical guidance. This movement has drawn attention as a promotion of technical efforts towards solutions to problems, focusing on private companies and with university and administration cooperation.

On the other hand, with the growing awareness of the soil pollution problem, pollution has come to influence land value. For this reason, surveys are made at the time of land transactions, and if pollution is discovered, clean-up costs are taken into consideration in contracts. It has been observed that in general the obligation to undertake clean-ups is held by the seller. Because clean-up costs have been included in economic transactions in such ways, it can be thought that voluntary clean-ups that are not determined by regulations will continue to proceed.

2) Environmental governance on soil and groundwater pollution

Around 1970 strict regulations were laid out concerning air and water pollution, but as stated above, regulations concerning soil pollution were limited to agricultural land. This had a connection with the characteristic particularities of soil pollution. That is, health damage by soil pollution is not as evident as that by water and air pollution. Soil pollution is usually extremely localized nature of the problem, and its impact is regionally limited. For this reason, the pollution itself is hard to discover, and even if the problem becomes more and more acute, it rarely becomes a significant social problem because of its confinement to discrete parcels of land.

On the other hand, when necessary measures are taken into consideration, matters become difficult because it's an underground phenomenon and numerous problems prevent solution, like the large clean-up costs. It can be said that as a result, the soil and groundwater regulations came late. Accordingly, the pollution is already serious, and it is presumably unavoidable if there is a criticism of the lack of national and corporate governance towards.

Also, in spite of its localized nature of soil problem, international efforts towards soil pollution control are proceeding at present. Now, some have criticized that Japan comes behind the movements, and it has been urged that introduction of a full-scale law system is necessitated.

For the introduction of the law system, the following points should be taken into consideration:

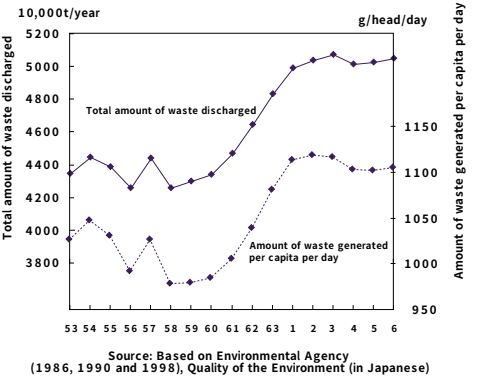
- Collection of information concerning the improvement of polluted areas
- Clean-up obligations and the cost burden: Types of regulations (clean-up obligation) falling on the responsible / owner or public undertakings (efforts carried out by self-governing bodies), etc.
- Clean-up methods and degrees

3) Business activities required for the future

Recent trends of voluntary efforts for the environment, in this field too, press for the promotion of measures carried out by enterprises. In fact, some enterprises have taken the ISO 14001 series introduction as an opportunity to reinforce measures. As social interest, for example through the mass media rises, efforts gain a real importance even if only viewed from the point of view of corporate image preservation. From now on, it goes without saying that such voluntary clean-up moves are expected to be carried out not by a limited number of enterprises but in general. It is necessary that at the same time such efforts are announced to foreign countries, and that the condition of our country's soil pollution be made clear.

Also, the solution of the soil pollution problem cannot be separated from technical issues. Even if voluntary efforts are planned, and however strictly the clean-up obligations are legalized, if there are no techniques to realize them,

measures can not be taken. Furthermore, even if clean up is theoretically possible, the technique must have an economically realistic burden. Soil clean-up techniques have recently been making rapid progress, but more technical developments are necessary to allow enterprises to make positive efforts towards this problem.



Source: Based on Environmental Agency
(1986, 1990 and 1998), Quality of the Environment (in Japanese)

Figure8-2 Trends in General Waste generated and Amount per Capita per Day

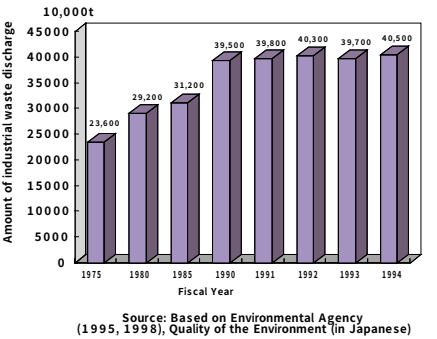
8.3 Waste problem

(1) Current situation of waste problem in Japan

The huge production and mass consumption society that has accompanied recent scientific developments gave birth to a use-and-discard lifestyle that has created huge quantities of waste. If one looks at our country's general waste discharge figures, a noticeably increasing trend is visible from the 60's, and the phenomenon of the outbreak of huge waste accompanying high growth can be seen (See Figures 8-2). Even if this increasing trend has become sluggish of late, about 50 millions tons of general waste are still discharged each year.

Industrial waste manifests in the same way charting an increasing discharge trend that accompanies our country's economic growth (See Figure 8-3). Today, the situation remains at a high level with an annual discharge amount of around 400 millions tons.

Also, if one looks qualitatively, wastes are becoming complex and varied as products and utilized material change. Difficult to dispose of waste such as large size products, or waste containing harmful substances are increasing.



Source: Based on Environmental Agency
(1995, 1998), Quality of the Environment (in Japanese)

Figure8-3 Trends in Amount of Industrial Waste Generated in Japan

Table 8-3 Disputes over Waste Disposal Facilities Installations and Arrests by Type of Waste Disposal Violation

(1) Regional Disputes Over Waste Disposal Facility Installations

Year	Before 1990	1991	1992	1993	1994	1995	1996	Total
Number of cases	9	28	23	43	48	49	21	221

Source: Environmental Agency (1997), Quality of Environment in Japan, (in Japanese)
Note 1: The number for 1996 is as of July 1996
Note 2: 94 cases within the 221 are in process

(2) Arrests by Type of Waste Disposal Violation (1996)

Type	Total	Illegal dumping	Unlicensed disposal business operations	Others
Cases	1,998	1,526	454	18
Percent of total	100.0	76.4	22.7	0.9

Source: Environmental Agency (1998), Quality of Environment in Japan, (in Japanese)

(2) Waste related problems (See Table 8-3)

With respect to waste, the following problems have been pointed out:

1) Shortage of waste treatment and disposal dumps

The capacity of intermediate treatment facilities and landfill dumps to deal with huge waste discharge is insufficient, and at the same time the construction of new treatment and disposal dumps is not proceeding smoothly. For this reason the securing of new locations, the promotion of waste control, reduction and recycling are growing as issues.

2) Environmental pollution

Because types of waste have diversified, there have been cases of treatment and incineration of waste that still contained harmful substances. For this reason, environmental pollution originating from waste treatment facilities themselves appeared, such as air pollution from cleaning plants, and groundwater pollution from landfill plants. Recently in particular, with the appearance of dioxins becoming a social problem, the improvement of urban incineration facilities has gained in urgency.

3) Illegal disposal

Illegal waste disposal is growing nationwide. The shredder dust disposal in Toyoshima, Kagawa Prefecture is famous as an example of large-scale waste. The problem finds its origins in economical reasons, with environmental preservation conditions for treatment facilities becoming severe, and with the great distance between disposal dumps and the waste creation location. Treatment / disposal cost is high and economies are made. Measures such as stiffer penalties have been planned, but do not fully resolve the problem. Other more thorough strengthening steps such as broadening the scope of the manifest system have been taken.

The appearance of such problems shows that there are faults on the waste governance side, and that the existing waste treatment system needs to be improved.

(3) Business in Japan and regulations on waste disposal and recycling

1) Business and Waste Disposal and Public Cleansing Law

In Japan, the Waste Disposal and Public Cleansing Law was enacted in 1970 and stipulates the fundamentals of waste disposal. This law defines waste in the following categories and stipulates the main treatments (See Figure 8-4)

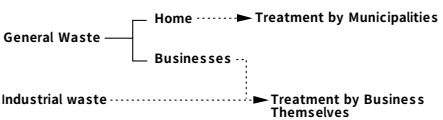


Figure 8-4 Waste Categories and the Treatment Responsibility

In other words, it stipulates that the responsibility for waste discharge from businesses and industry lies on the businesses themselves, and those cities, towns and villages must treat general home waste. In the existing laws, the companies' treatment responsibility is limited to their role as waste dischargers, and does not reach their role as original producers of the general home waste.

2) Companies and laws related to recycling

Nevertheless, the increase of waste and the difficulty of treatment have resulted in pressure for a review of the Waste Disposal Law rules. The following laws concerning recycling, established in 1991, make the related businesses assume a certain role to attempt to solve this problem. In particular, moves making the producers bear a certain responsibility for waste treatment has become stronger recently. These moves are based on the thought that the involvement of companies is essential in order to realize the cyclical nature of society from now on.

i) Law for Promotion of Utilization of Recyclable Resources, 1991

Targeted products and businesses:

- Specified businesses (paper manufacturing, glass container manufacturing, and construction)
- Type 1: designated products (cars, TVs, refrigerators etc.)
- Type 2: designated products (beverage aluminum and steel cans, etc.)
- Specified by-products (slag, coal ashes, etc.)

ii) Law for Promotion of Sorted Collection and Recycling of Containers and Packages, 1995

Targeted businesses:

- Specified businesses using packages
- Specified businesses manufacturing packages
- Specified businesses using wrappings

iii) Waste Electronics Law, 1998

Main obligations:

- Obligation of small outlets to take back articles (obligation to hand it over to manufacturers)
- Obligation of manufacturers and importers to take back articles (recycling obligation)
- Costs paid by the consumer

As shown in such laws, the tendency to stipulate recycling obligations to businesses for waste control has become stronger. Hereafter, it is expected that demands for producers of waste control will become stronger and stronger, with regulations broadening in multiple directions.

In such a context, the thought that the producer's responsibility concerning waste should be enlarged is appearing theoretically too (it is debated principally in Europe as "Extended Producer Responsibility"). It may be essential for enterprises to get actively involved in this debate.

(4) The response of business

It can be said that local administrations have carried out the majority of Japanese waste management up to the present, and that actually the involvement of enterprises has been little. Even for principles of producer responsibility prescribed by law, there are cases where treatment has been left to local administrations. One example is so called "mixed waste" (industrial wastes mixed with general wastes, which the need is recognized to be treated by cities, towns and villages, or which can be dealt together with general waste, based on the Waste Treatment Law's tenth article, second clause). Moreover, most waste producer companies which are responsible for the treatment have actually entrusted to businesses specializing in the treatment. From this point of view, it can be said that until now, the enterprises' concern about waste problems was low compared to other environmental issues.

Nevertheless, recent trends of voluntary efforts for protecting environment have also begun to appear in this field. For example, many industries have called for waste control, recycling, and the promotion of treatment by themselves and have targeted landfill ratio and recycle ratio objectives,with respect to Keidanren (the Federation of Economic Organizations) Environmental Voluntary Action Plan. Furthermore, there are businesses that advocate zero emissions, and others that are making concrete efforts towards their own environmental objectives. With enterprises having realized their social responsibility as waste producers, such efforts seem indicative that strong efforts are beginning to be applied on the waste problem, as a global effort towards environmental issues.

Such movement is likely to get bigger. Then, together with the reinforcement of regulations promoting recycling described above, environmental efforts made by businesses will continue to gain in importance. For the construction of circulation society in the 21st century, positive efforts from all enterprises will be required.

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9. Environmental Governance and the Industries - Strategy and Response to Global Environmental Problems by Keidanren -

9.1 Introduction

The Japanese industries had to restart by supplying clothes, food and housing to seventy-five million desperate people after the Second World War when production facilities fell into ruins. Over the ensuing fifty years, the Japanese population grew by fifty million to reach the current more than one hundred twenty five million. During this period of change, the industry made efforts to improve the standard of living of this growing population by supplying reprocessed products procured from resources, energy and food from foreign countries. Acquiring foreign currency for production on an enlarged scale through exporting portions of produced materials has contributed to making Japan the world's second greatest economic power.

Despite the efforts of industries, the people had to face the painful fact of pollution by many industries as they struggled to control pollution during industrial growth. In the 1980's, due to an international agreement, industry came under pressure to respond to environmental problems which had arisen, such as global warming, acid rain, depletion of ozone layer, ocean pollution, destruction of tropical rain forests and extinction of species. Problems referred to as "negative inheritance" which lurk behind the prosperity of Japan such as dioxin, endocrine disrupter, soil pollution and deterioration of natural ecological system have also appeared.

In this chapter, analysis of the strategy and posture of the industries is given, considering what industry has done and should do in the future through concrete examples. These will include how industry has carried out environmental governance in the age of global environmentalism and how it plans to continue in the future. Focus will be on the activities of the Federation of Economic Organizations (Keidanren) which is leading the Japanese industries and the enactment and results of the "Keidanren Global Environment Charter" which is emblematic of environment governance.

9. 2 Advent of the age of global environmentalism and the industries

(1) Emergence of global environmental problems

When the 1980's began, phenomena that indicated the deterioration of the global environment had appeared all over the world. In 1985, the hole in the ozone layer above the South Pole was confirmed. It had been forecasted, in the research paper published in 1974 by Dr. Roland, a professor of the University of California, that chlorofluorocarbons (CFCs) would destroy the ozone layer. After the "Montreal Protocol on Substances that Deplete the Ozone Layer" was concluded in 1987. Also, the damages to lakes, marshes and forests in North America and

Europe became obvious and North America experienced an unusually hot and lengthy summer. Dr. Hansen of NASA warned Congress of the danger of global warming, after which the issue achieved societal recognition.

The destruction of the tropical rain forests became of international concern due to the vigorous activities of environmental protection organizations. These organizations also exposed damages caused by repeated transboundary movements of hazardous wastes from developed countries to developing countries as developed countries could not themselves solve their domestic problems. "The Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal" was concluded in 1989. Ocean pollution was also occurring and causing damages in several areas. In particular, in 1989, the Valdez tanker went aground in the Alaskan gulf and the ensuing oil spill caused massive damages to the ecological system in the gulf.

(2) Response of international society to global environmental issues

In response to these conditions, the heads of each state urged the need to take environmental protection countermeasures on a global scale at the Arch summit meeting in France in 1989. At the meeting, Japan declared its intention to offer three hundred billion yen in support of preservation of the tropical rain forests and improvement of environmental response ability by developing countries.

The Industrial Chamber of Commerce announced the "Business Charter for Sustainable Development - Principles for Environmental Management" (See Appendix: Table 9-1) in November 1990 and appealed to enterprises in each country for support of this charter. In 1990, Mr. Schmidheiny, who had a request from Mr. Strong, the Secretary General of the United Nations Conference on Environment and Development (UNCED), contacted forty-eight economic leaders from twenty-seven countries and the BCSD (Business Council for Sustainable Development) was organized. Seven financial leaders from Japan participated in this chamber and they published "Changing the Course -a challenge for sustainable development." This publishment influenced the industries. As one of the results, this appeal has promoted the start of the ISO14000 series, which was introduced in each country after the requirements of the establishment of environmental management systems by the International Standardizing Organization were accepted.

(3) Response of domestic society to global environmental issues

The Japanese industries started its activities mainly under the guidance of the Federation of Economic Organizations to cope with the above mentioned apparent environmental problems and the consequent movements of international politics and international industry. In 1986, Japanese industry investigated the state of activities of UNEP (United Nations Environment Programme) and in 1988 it carried out an intense discussion of environmental problems and environmental

administration in the Keidanren Environmental Security Committee, and established Working Groups in this committee. In addition, in 1990, Japanese industry strongly appealed for directions and thoughts towards global environmental problems of the entire industries by carrying out proposals such as the "Basic Point of View on Environmental Problems" and the "Task of Waste Disposal Countermeasures".

9. 3 Establishment and effects of the "Keidanren Global Environment Charter"

(1) In 1991, proposals and appeals regarding global environmental problems were carried out by the government, industries and non-government organizations, aiming at the United Nations Conference on Environment and Development (Earth Summit) in 1992. The Keidanren, which consists of more than one thousand representative Japanese companies and principal industrial organizations such as manufacturing, trading, distribution, financial and energy industries, has carried out the establishment of the "Keidanren Global Environment Charter" which was based on the "Basic Point of View on Environmental Problems" and the "Task of Waste Disposal Countermeasures", which were announced in 1990.

The "Keidanren Global Environment Charter" is structured according to fundamental ideas and operational guidance which companies need to cope positively with environmental conservation. Eleven fields and twenty-four items, such as "Management Policies Regarding Environmental Problems" and "In-house Organization" and ten items of consideration of the environment when a company advances abroad are included (See Appendix: Table 9-2). When establishment of this charter, Keidanren secretariat considered courses of practical actions. Items examined includes: 1) that this charter must have international universality by examining fundamental environmental problems; 2) that a deeper understanding of the existing The Business Charter for Sustainable Development by International Chamber of Commerce is necessary; and 3) that this charter must introduce concepts which take the originality and thought of Japan's industries into consideration and are appropriate for the age of global environmentalism.

In 1991, not all companies understood global environmental problems well. Therefore, some company leaders criticized that the establishment of this charter would interfere with company activities because discussion went too deeply into minute detail during the process of establishment. However, strong leadership taken by the then president of Keidanren who has lofty ideas, the understanding and approval of many advanced enterprises and the passionate and persevering efforts of the secretariat acted in concert with this matter. Finally, in April 1991, the committee members requested of the official upper-level company members and industrial bodies to observe the charter.

(2) After announcement of the "Keidanren Global Environment Charter", the establishment of the charter of each industry and management guidance were carried out by main industrial organizations and member companies of the

Keidanren. Also many individual companies instituted these principals in the same way and established in-house organizations such as global environment committees to conduct activities related to the environment and to penetrate the entire company and global environmental divisions which specialize tasks to cope with environmental problems.

The new established organizations within companies applied the charter and the operational guidance to educate the employees about the importance of consideration of the environment. The companies reflected these principals in their business activities and applied the charter to help consumers and citizen make efforts to understand the necessity of consideration of the environment. Requests and reports, e.g. voluntary plans, by the government to enterprises for their independent environmental conservation activities used these noteworthy efforts as recommendable examples.

Thereafter, Keidanren established the "Keidanren Nature Conservation Fund" in April 1992 as part of their practical activities and started supporting nature preservation movements conducted by NGOs. In June of the same year, Keidanren sent a mission to the Earth Summit in Brazil to announce environmental preservation activities by Japanese industries. Also in the same year, there was a big argument concerning the enactment of Basic Environmental Law. Keidanren was stimulated by this argument and carried out proposals in order to emphasize the importance of voluntary activities by industries in September. These proposals included "Views of the industries on the examination of Basic Environmental Law - A Shift from governmental regulatory measures and towards non-governmental voluntary activities."

In 1993 the Environment Administration Standards Council (Inquiry Commission) was inaugurated in Japan with participation of the government, industries, labor and consumer organizations, as international standards about environment administration / inspection (ISO14000 series) was established by the International Organization for Standardization which was proposed by BCSD. The industries participated positively in the examination of establishment of ISO14000, which was led mainly by Keidanren because of their regret of their hesitation to participate in ISO9000. These activities led to the official issuance of international standards in September 1996.

(3) One of the concrete proofs that the ideals of the "Keidanren Global Environment Charter" had deeply infiltrated into the industries is that company executives, who had noticed that company management needed to be changed, recognized that it was a very important task for enterprises to solve environmental problems. They took positive initiatives to establish the principals and new in-house organizations for environment. Another relevant factor was that these ideals spread throughout entire companies because employees were influenced by the executive initiatives and became ready to accept their attitudes.

Considering the above mentioned circumstances, the establishment of the "Keidanren Global Environment Charter", which was a good opportunity to filter

the environmental conservation movement into the industries, can be estimated as a milestone in the start of environment governance in Japanese industry which was facing the age of global environmentalism. It outlined the ideal style and direction of environmental governance for later industry and became the axis of coordinates for independent activities of environmental conservation by Japanese industry and enterprises.

9. 4 The course of voluntary activities of the industries

(1) In November 1993, the Basic Environment Law were enacted and it was determined that each obligation of the government, local administrations and the people should be carried out according to the fundamental ideals of the law. In December of 1994, the Basic Environment Plan was established and the construction of a society in which "sound material cycle", "harmonious coexistence", "participation" and "international activities" would be realized was set up as a long-term goal. In 1995, it was decided that COP3 (The Third Conference of the Parties to the Framework Convention on Climate Change) would be held in Kyoto.

(2) As a response to this decision, Keidanren announced the "Environment Appeal by Keidanren - The Declaration on Voluntary Action of Japanese Industry Directed at Conservation of Global Environment in the 21st Century" and asked the member organizations to establish concrete goals and plans. Environmental ethics, ecological efficiency and voluntary activities were settled on as criteria for environmental action. The Appeal includes seven items regarding countermeasures to global warming, six items regarding construction of a circulation economic society, three items regarding environmental inspection and several items about consideration of the environment for the Japanese enterprises operating abroad. In 1997, 36 industries and 137 organizations participated in this movement with the announcement of independent activity plans. In January of 1999, the first results of follow-up were announced and voluntary activities by industries became firmly established.

(3) In 1996, Keidanren proposed the "Task of Construction of the Sound Material Cycle Society - Countermeasures for Waste Disposal." In 1997, "View of the Introduction of PRTR (Pollutant Release and Transfer Register) System" was also compiled regarding chemical substance related matters. This is an example of the voluntary activities of the industries. Thereafter, the first investigation result report was announced in 1998 and the second one is planned for publication within 1999. Regarding the problems of global warming, Keidanren took the opportunity of COP3 being held in Kyoto in 1997 to sum up its views in "COP3 and Countermeasures to Global Warming". During the Kyoto convention, Keidanren held a "Forum on Countermeasures to Global Warming by Financial Leaders in the World" in mutual cooperation with the International Chamber of Commerce and the Business Leaders of the World Convention and emphasized the importance of voluntary activities by industries.

(4) According to an Keidanren investigation by questionnaire, when the "Keidanren Global Environment Charter" was announced in 1991, the rate of companies enacting charters and guidance was 19% (103 companies) and that of companies establishing goals and plans for environmental contamination factor reduction was 33% (178 companies). According to the investigation in the Year 1996, when the Voluntary Action Declaration was made, the rated were 59% (305 companies) and 56% (290 companies, 71 %, if companies in preparation are included), respectively. The acquisition of ISO certification in Japan at the end of 1998 was 1,542 sites and this is a remarkable number compared with the world estimated acquirement number of 5,446 in September of the same year.

As the world is currently in the age of global environmentalism, companies have become aware that they cannot obtain social acceptance if they do not pay attention to environmental problems. Therefore, they are coping with the problems rather positively. They are making continuous efforts, such as introduction of environmental management, study of LCA and environmental accounts, green procurement, reduction of toxic chemical substances, collection of discarded products, response to recycling and resource and energy saving. This attitude by companies shows their willingness to conduct voluntary activities rather than enforcement by regulations. They are trying to make the best use of the flexibility and vitality of private companies as well as their acknowledgement of the importance of environmental conservation.

It could be estimated that environmental governance by industries is proceeding steadily by the overall movement of industry and the practices of individual companies when given opportunity to establish the "Keidanren Global Environment Charter".

9. 5 The role of industries in environmental governance of the industries in the 21st century

The first task that companies face in the 21st century will be about the question of determining the meaning of their own existence. Humanity has continually invented to change social systems for the better using good ideas to obtain happy lifestyles. In the context of human history, democracy and the market economy, with the existence of independent companies, are ideas designed to make life happier. However, if companies were in a position to reduce human happiness, their very existence would be brutally opposed. This is the age to question the meaning of the existence of companies through consideration of frequent recent deplorable activities by companies. Such activities in the area of the earth's environment are a blinking yellow light warning of a threat to human existence.

Secondly, Japanese companies have to be aware that they must face up to a coming age which will evaluate quality improvement more than guarantee of quantity due to the population decline starting at the beginning of the 21st century and a major change in standards of evaluation. There will also be a shift from an economic system that prioritized quantity that had been built to secure clothing,

food and housing for the explosively growing Japanese population after W.W. II. As the future role of companies in this difficult situation is examined, a major task will be to manage the "negative inheritance" which exists in various fields behind the prosperity of the Japanese economy.

Thirdly, company activities will draw more attention internationally because the availability of information will become highly diversified on a world scale. There is a possibility that the business activities, which are based on a sense of evaluation that is accepted only in Japan, will be censured internationally due to, for example, product evaluation in international markets, increase of foreign investors and shareholders, monitoring by rating organizations and criticism of double standards. Therefore, it is essential for business executives to ensure the transparency of company management, information disclosure and the responsibility of explanation of relevant results as well.

The task of environmental governance, which is required of industry in the 21st century, is summed up, with reference to the above mentioned fundamental thoughts, in three ways as follow.

(1) Guidelines in pioneering compatibility of economic growth and environmental conservation

The problems of the global environment have shifted from the age of ideas to the age of practical application. When consideration is given to reconciliation between economic growth and the response to environmental problems such as global warming, waste disposal, efficient use of resources, recycling, nature conservation and ocean pollution prevention, the general good can easily win popularity in the age of ideas. However, in the age of practicality, itemized discussion becomes necessary due to industrial circumstances and the occurrence of problems within individual companies. Pioneering guidelines, which are representative proposals for the entire industries, are required to give guidance without regard to interests, merits and demerits of industry and individual companies.

Improvement of reliability of companies regarding environmental activities and positive transparency and information disclosure to obtain support from interested parties will become more essential. It is also important to examine both thoughts and methods that can reconcile between company secrets and information disclosure. It will be brought out that industry has to take some kind of responsibility for solutions to the "negative inheritance" which was left behind by Japan's economic prosperity. As the 21st century approaches, it is necessary for the industries, with reference to advanced ideas which can gain approval of both international society and citizens through establishment of the "Keidanren Global Environment Charter", to construct pioneering guidelines. These guidelines must indicate reconciliation between economic growth and environmental conservation that is suitable for the new age with consideration of the movements of western countries.

(2) A positive strategy toward construction of a circulation society

Solutions to global environmental problems require a proper strategy with concerted efforts of nations, local governments, industries and citizens. In particular, mitigation of global warming, reduction of waste disposal, recycling activities and resource saving are related to citizen's lifestyles. It has become important for industries, not only to fulfil their obligations in solving problems, but also to be involved with the problems that cannot be solved solely by industries. To maintain activities that can be related to overall results by proposing policies such as improvement of social systems and calling on citizens for cooperation is expected for industries. Since an industrial person is also a member of citizens, it is desirable for industry to have wide concern for solutions to environmental problems including practical activities that can obtain the approval of many people involved in industry.

(3) Positive promotion of international strategies

Japan, with the world's second largest economy, can only exist through trading. With its production basis all over the world, Japan has a quite deep relationship with international society.

From the environmental viewpoint, Japan is concerned in international society directly and indirectly through problems such as CO_2 reduction, reconciliation between environment and trading, pollution problems in developing countries and the problems of ensuring its international competitiveness.

On the other hand, Japan has a record of difficult experiences in overcoming pollution problems, and development of energy-saving technologies during the term of the oil-shock has an international reputation for excellence.

Taking these situation into consideration, the industries in Japan need to establish international guidelines in cooperation with Japanese government and offer proposals, which are useful in conserving the global environment, keeping its international competitiveness. The reconciliation between maintenance of a free trade system and the conservation of resources and the environment: so-called problems of "environment and trade", and the problems of guideline establishment which are related with international competitiness, are the lifeline for Japan to exist through trade. Therefore, industry must take a positive role in solving these problems.

It is also desirable for Japan to offer developing countries technologies and devices for pollution prevention as well as measures which were applied to past difficult experiences or to carry out support and cooperation such as introduction of energy saving technologies and processes. In particular, it is very important for Japan to offer both support and cooperation for capacity building for environmental infrastructure preparation in developing countries. To offer industry's experiences and know-how positively to international society will be a major preparatory step in contributing to environmental conservation as well as

future expansion of industries. Japan has experience with management of pollution problems and step by step responses to global environmental problems. Developing countries are facing these tasks simultaneously at present, and appropriate advises from Japanese industries are expected.

9. 6 Conclusion

To evaluate the role of industries in Japanese environmental governance after entering the age of global environmentalism, let's work on the assumption that industry had not enacted the "Keidanren Global Environment Charter" in 1991. Although there might be some objections, I suppose that the state of response to environmental conservation by industries would have been just as it is now even if the enactment of the charter had not existed. It is because, if consideration is given to the reality of global environmental deterioration, international criticisms that Japan's industries lack the responsibility, and the change in the population's sentiment toward environmental conservation, it is assumed that the state of the response to environmental conservation by industries would have been pushed to the present level due to the force of introduction of regulations and the pressure of adverse criticism from the media and citizens who could no longer abide the posture of industries.

This is my evaluation of the response to environmental problems by industries, but companies would have had to take measures to deal with the situation by mending the holes exposed by public and media criticism. Perhaps the companies would not have applied better strategies, based on liberal and flexible ideas, due to their habit of passivity. Therefore, it is assumed that social evaluation of industries and companies must have worsened until forces such as regulation by government had proven to be effective. However, the reality is that the industries would most likely have taken drastic steps to cope with the situation and regain popularity before being forced to face a serious situation. Therefore, the worst case scenario is unlikely. It is supposed that the drastic measure to deal with such a negative situation would have resulted in enactment of the "Keidanren Global Environment Charter". That is why I have evaluated the "Keidanren Global Environment Charter" as being in the important position of initiating environmental governance by industries.

There are no clear interpretations or standards to judge environmental governance of industries, but it is believed that, through consideration of the viewpoints of the present and the next generation, the general preference of industries is to carry out positive activities for global conservation by themselves. To show its attitude toward conservation, industries should expose its own initiative, thoughts and response policies, keeping in mind that environmental problems change in complicated ways as time goes by. Each company should carry out its strategy before being forced to from outside by applying its own strong points and originality.

To solve environmental problems that cannot be solved by industries alone, if necessary, the industries should appeal to concerned actors such as government, local governments and the people. Perhaps, this is a major obligation, regarding environmental governance, for them to heighten the efficiency of environmental conservation in general. Companies have made great efforts to conserve and improve the environment, but it has been acknowledged that accumulation of the best micro-measures does not always agree with the best macro-measures empirically. It is important for industries to implement environmental governance in order to build a better society by applying positive strategies to problems including the ones which neither industry nor companies alone can solve.

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Table9-1 The Business Charter for sustainable Development -Principles for Environmental Management

((1) Foreword
(2) Introduction
(3) Principles (titles only)

1. Corporate priority
2. Integrated management
3. Process of improvement
4. Employee education
5. Prior assessment
6. Products and services
7. Customer advice
8. Facilities and operations
9. Research
10. Precautionary approach
11. Contractors and suppliers
12. Emergency preparedness
13. Transfer of technology
14. Contributing to the common effort
15. Openness to concerns
16. Compliance and reporting

(4) Support for the Charter

Source: International Chamber of Commerce

Table 9-2 Keidanren Global Environment Charter (Appendix: 10 items of environmental consideration for business expansion abroad)

Introduction (Omitted)
Basic Philosophy "A company's existence is closely bound up with the global environment as well as with the community it is based in. In carrying on its activities, each company must maintain respect for human dignity, and strive toward a future society where the global environment is protected. We must aim to construct a society whose members cooperate together on environmental problems, a society where sustainable development on a global scale is possible, where companies enjoy a relationship of mutual trust with local citizens and consumers, and where they vigorously and freely develop their operations while preserving the environment. Each company must aim at being a good global corporate citizen, recognizing that grappling with environmental problems is essential to its own existence and its activities."
Guidelines for corporate action (titles only)

1. General management policies
2. Corporate organization
3. Concern for the environment
4. Technology development
5. Technology transfers
6. Emergency measures
7. Public relations and education
8. Community Relations
9. Overseas operations
10. Contribution to public policies
11. Response to global problems

Ten-Points-Environmental Guidelines for the Japanese Enterprises Operating Abroad

1. Establish a constructive attitude toward environmental protection and try to raise complete awareness of the issues among those concerned.
2. Conduct a full environmental assessment before starting overseas business operations. After the start of activities, try to collect data, and, if necessary, conduct an assessment.
3. Make environmental protection a priority at overseas sites and, as a minimum requirement, abide by the environmental standards of the host country. Apply Japanese standards concerning the management of harmful substances.
4. Confer fully with the parties concerned at the operational site and cooperate with them in the transfer and local application of environment-related Japanese technologies and know-how.
5. Establish an environmental management system, including the appointment of staff responsible for environmental control. Also, try to improve qualifications for improve qualifications for the necessary personnel.
6. Provide the local community with information on environmental measures on a regular basis.
7. Be sure that when environment-related issues arise, efforts are made to prevent them from developing into social and cultural frictions. Deal with them through scientific and rational discussions.
8. Cooperate in the promotion of the host country's scientific and rational environmental measures.
9. Actively publicize, both at home and abroad, the activities of overseas businesses that reflect our activities on the environmental consideration.
10. Ensure that the home offices of the corporations operating overseas understand the importance of the measures for dealing with environmental issues, as they effect their overseas affiliates. The head office must try to establish a support system that can, for instance, send specialists abroad whenever the need arises.

Source: Japan Federation of Economic Organization, 23 April 1991

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