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Environmental Information Policy and Utilization of Information Technology:
Toward a Shift in Environmental Policy Paradigm

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Contents

Environmental Information Policy and Utilization of Information Technology: Toward a Shift in Environmental Administration Paradigm

Summary

1. As observed in the case of global warming, environmental problems have ceased to be local issues, with the relativization of the cause-effect relationship between sources and environmental burden (i.e. pollution). Based on this development, some have pointed out the need for a shift in environmental administration paradigm from the traditional regulation and supervision of firms identified as sources of pollution to collaboration between the public and private sectors, relying to some extent on the initiatives of businesses and local residents. In this regard, the distribution of environmental information is important to enable the efficient implementation of environmental policy as well as to ensure smooth sharing of responsibilities between the public and private sector. It is therefore considered that the development of infrastructure for providing sufficient environmental information will be a key factor in promoting environmental policy in the years ahead. Focusing on environmental information and its distribution in the framework of environmental policy as a requirement for promoting collaboration between the public and private sectors, this report mainly examines how best to utilize information technology as well as institutional issues related thereto.

2. Collaboration between the public and private sectors has only begun to materialize at the level of local governments, which are important actors in environmental administration. However, some issues have already been pointed out. In bringing about a shift in environmental administration paradigm as mentioned above, the existing divide in environmental information should be addressed, not only between private companies and residents but also between the government and the private sector – including private companies – to ensure effective sharing of information among the governments (local authorities), businesses and residents.

At the same time, the collection and provision of information should consider the secrecy inherent to environmental information, the diversity of information that reflects specific local conditions as well as the complexity and specialty in handling information, including the scope of disclosure.

3. Information technology is a potentially effective tool in sharing information. In the US, information technology has been introduced through the "e-government" initiative, a concrete measure for reinventing government. Based on the five principles for environmental regulation reform, the Environmental Protection Agency has also been engaged in the reconstruction of environmental administration with information technology. The improvement of environmental information has been identified as a priority in the initiative. A framework for active participation of local residents and private companies has been developed mainly through the establishment of a system to ensure consistent evaluation of environmental levels in various parts of the country in terms of air and soil pollution, among others.

The improvement of environmental information and the utilization of information technology have also made headway at the level of local areas. Coordination between industry,

academia and the government can be observed in measures such as the development of environmental legislation, electronic processing of applications for permission and approval, original methods of environmental monitoring, as well as the enhancement of, and improved access to, information related to the Superfund Act.

In Nordic countries (Finland and Sweden), the framework of an e-government based on information technology has been developed to improve not only efficiency but also convenience in view of the harsh climate. A similar movement can be observed in environmental administration. At the local level, relevant authorities, in cooperation with the central government, are developing a monitoring system. Other examples of collaboration among the industrial, academic and public sectors include the development of environmental information technology and lifecycle assessment. Such moves are supported by the principle of disclosure of environmental information. In the UK, some local governments have adopted the corporate environmental management system (EMAS), attesting to their willingness to manage environmental performance in collaboration with local communities (residents and businesses).

Germany enacted an Environmental Statistics Law for enhancing environmental information along with the disclosure scheme under the Environmental Information Disclosure Law. Such institutional infrastructure, though not necessarily linked with information technology, should play an important role in its eventual utilization.

4. Turning to the advancement of e-government in Japan, substantial progress can be observed in the installation of information equipment and networking. However, some technical issues (security, certification, etc.) and institutional issues (administrative procedures, etc.) remain unresolved, as well as sources of financing. All in all, the government sector is experiencing a considerable delay in introducing electronic procedures.

At the local areas, computerization plans have been prepared mainly in prefectures and large cities for developing both hardware and software. In order to promote e-government under even tougher financial constraints than in the central government, local governments needs to change their administrative processes in the first place, then computerize administration systems in a suitable manner. It is also important for environmental administration to ensure smooth introduction of information technology in the government sector through information sharing based on public-private collaboration.

There has been notable progress in environmental information policy. For instance, the National Institute for Environmental Studies has developed an environmental information system to provide data on the Internet. The environmental information thus provided is expected to improve both qualitatively and quantitatively with the development of related schemes and operations, chiefly under the Information Disclosure Law and the PRTR Law. The utilization of information technology and the development of e-government has started only recently in local governments. Some also point out many issues regarding the disclosure of environmental information, as ordinances have been revised in only a handful of local governments to ensure compliance with the Information Disclosure Law.

Nonetheless, some local governments have taken the initiative in introducing information technology for the enhancement and disclosure of environmental information. Examples in waste disposal include the identification of the weight and movement of household refuse using the global positioning system (GPS); a household refuse management system using bar codes; and an illegal dumping prevention system with remote surveillance cameras. Such initiatives are supported by heightened awareness of environmental problems on the part of local residents and cooperation/collaboration related to the surveillance of illegal dumping. Some local governments have introduced a local version of environmental accounting on a pilot basis to start the

disclosure of information in electronic form. Thus, the enhancement of environmental information and the sharing of such information between the public and private sectors is making headway at the local level, through the implementation of environmental monitoring and environmental management systems.

5. Any shift in the environmental administration paradigm through public-private collaboration will require better environmental information and the elimination of the existing divide in environmental information. However, challenges remain in the field, including the development of hardware and software for creating e-government with information technology as well as institutional and operational issues for the enhancement of environmental information. The contents of environmental information should also be considered from the viewpoint of evaluating environmental performance at the local level. Above all, the development of infrastructure such as soil pollution databases will be important in providing essential information for corporate activities and daily life of the public.

The implementation of environmental information policy must consider the non-disclosure of expertise and technological information owned by businesses. Consideration should also be given to the specific characters of environmental information (information related to toxicity and environmental burden in particular). Indeed, private companies often disclose information related to toxicity on a voluntary basis for the purpose of environmental risk management, including data on soil pollution. However, companies are always concerned about possible public criticism as a result of disclosure. The government and local residents must refrain from preventing legitimate corporate activities.

The many issues to be addressed in bringing about a shift of environmental administration paradigm require more than efforts at the level of local communities. They need to be overcome through coordinated efforts with support from the central government, in such forms as cooperation covering wide areas and mutual assistance among the industrial, academic and private sectors (including NGOs and NPOs).

Introduction

This report examines a new concept of "environmental information policy," which has been gaining importance as the focus of environmental policy has changed from industrial pollution problems to environmental problems. In light of the characteristics of "environmental information," which differ substantially from those of general information, this report discusses how information technology (IT), which has already been introduced in the public and private sectors, may be used to address environmental problems. Consideration will also be given to the current status and remaining issues from institutional and systemic standpoints. Assuming that the smooth collection, accumulation and distribution of environmental information will help address future environmental problems, this report focuses not on information technology itself, but on the characteristics of environmental information that affect the use of IT, on institutional issues related to the collection, accumulation and distribution of environmental information, as well as on the socio-economic system that surrounds them.

Since "environmental information" itself is a new concept, this report should be regarded as pilot study.

Contents of the report

This report comprises four chapters. Chapter I outlines the above-mentioned transition from industrial pollution problems to environmental problems and the accompanying changes in policy measures, as well as the usefulness of environmental information and the importance of environmental information policy. Chapter II provides an overview of the characteristics of environmental administration and the current status of environmental information policy overseas including the US and Nordic countries (Finland and Sweden), along with their implications for environmental information policy in Japan. Chapter III focuses on developments in Japan and examines the development of environmental information policy, particularly innovative measures at the national or local level, outlining the introduction of IT in local governments and tasks for the years ahead. Relevant challenges in the area of environmental information will also be identified. Based on the analysis in the previous chapters, Chapter IV identifies an agenda and issues to be addressed in future environmental information policy.

I. Transition Environmental Policy Measures and Environmental Information Policy

This chapter first outlines the transition of environmental administration, followed by discussion on environmental information and on environmental administration that revolves around such information.

1. Transition of Environmental Administration

1.1. Transition from Industrial Pollution Problems to Environmental Problems and Changes in Policy Measures – Environmental Information Policy

The focus of environmental issues has shifted from the typical seven types of industrial pollution caused mainly by corporate activities, including air and water pollution, to modern types of problems including global warming, ozone depletion and endocrine disrupters.

In terms of policy issues, the shift is marked by the relativization of the cause-effect relationship, in that many complex factors in time and space combine to create environmental burden, making it harder to identify the relationship between those causes and environmental pollution. The increase in the number and complexity of the factors has resulted in the diversification of actors involved in addressing environmental problems. Against this backdrop, Local Agenda 21, adopted by the United Nations in the early 1990s, states that various actors, including governments, businesses, local residents and NPOs, need to work together in addressing environmental problems at the local level – i.e. the need of a shift in paradigm.

What kind of policy measures should be taken to address such policy issues? Traditional policy measures against industrial pollution are known as “direct measures” in that governments are directly involved. Direct measures are further classified into two categories, including the development of environmental infrastructure, in which governments themselves are actively involved, and various regulations on activities in the private sector. They may be defined as a paradigm of unilateral government control.

In contrast, recent policy measures to cope with environmental problems have diversified due to the complication of factors producing environmental burden and the multiplication of causes. As a result, attention has shifted to “indirect measures” to reduce environmental burden indirectly by changing corporate behavior, etc. Some of the indirect measures are focused on government activities themselves including research and development in public institutes and the reduction in environmental burden through green procurement, while others induce changes in corporate activities through taxes and levies, including the controversial carbon tax, as well as through environmental subsidies and emission rights trading.

Most importantly, the collection and distribution of relevant information – “environmental information” to be discussed later – is required both qualitatively and quantitatively to ensure effectiveness of indirect measures, in addition to direct measures. In traditional industrial pollution problems, the existence of an information divide between businesses and the local population justified certain involvement of governments in the flow of environmental information to ensure public access to confidential information owned by businesses, including the emissions of hazardous substances, thus enabling them to demand appropriate policy measures. In this sense, information flowed in one direction. As regards the current environmental problems, however, collaboration between the public and private sectors is important because it is difficult for governments alone to cope with such problems. Governments, businesses (including NPOs) and residents need to share information in

addressing environmental problems from respective standpoints.

The collection and distribution of information should be supported by basic policy measures, which may be understood as software infrastructure. They include the constitutional right to know and legislative schemes such as the Information Disclosure Law, as well as environmental information databases and the PRTR Law[1], which also involve the private sector. Environmental information policy, discussed in this report, comprises such basic policy measures, and is based on environmental information. In other words, environmental information policy focuses on policy measures as the foundation of direct and indirect policy measures.

1.2. Definition and Functions of Environmental Information

What is "environmental information"?

Environmental information encompasses not only environmental information such as the toxicity of chemical substances (environmental information in a narrow sense) but also on "facility and technology information" such as private recycling facilities, "information related to environmental systems and policies" including information on environmental laws, regulations and policies, as well as information on "environmental management" including information on companies seeking compliance with the ISO14000 series and on corporate environment reports and environmental accounting (environmental information in a broad sense). (For the purpose of this report, "environmental information" refers to environmental information in a broad sense.)[2]

Most of the current environmental problems are beyond the complete understanding of any one person, yet the whole picture cannot be grasped without information. Here, information is a tool for transferring knowledge to others. It is noted that "information" differs from "data."[3] For example, when the density of a substance in the environment is measured, the measured density itself is a mere datum, and is insufficient as environmental information. The datum is useful only when it is accompanied by relevant expertise such as criteria concerning toxicity and techniques of comparison with average density. Information is thus more important than data because it is communicated with clearer purposes as materials for judgment, etc.

Environmental information that is solely used for environmental administration has different characteristics from information used for ordinary policies. Namely, it is characterized by (1) secrecy, (2) diversity and (3) complexity and specialty.

First, information related to hazardous substances generated by corporate activities and their emissions tends to be kept secret, for it negatively affects the image of the companies concerned. Second, different countries and different regions use different sorts of environmental information in policy-making, as the natural environment varies in urban and mountainous areas, requiring distinct ideas for protecting the nature. That is, each area has its own requirement of environmental information. Third, the aforementioned characteristics of environmental information result in various complexities: the scope of information to be collected and how such information should be collected; how to manage the information thus collected; the scope of information to be disclosed and those who have the right to request such disclosure, which should be determined in relation to the secrecy of corporate information. Environmental

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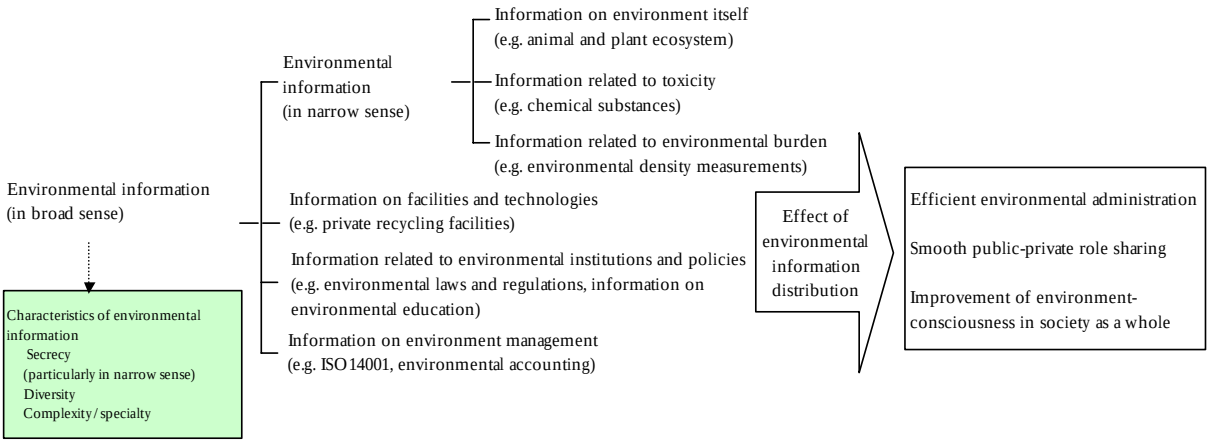
1 Pollutant Release and Transfer Register Law (Law No.86 of 1999).

2 Yumihiko Matsu-ura, *Kankyo-ho*, Seibunndo, 1999, p.99 1.22 classifies environmental information into (1) information related to the environment itself, (2) information related to toxicity, (3) information related to facilities such as the use and emission of substances creating environmental burden, (4) information related to environmental burden, (5) information related to environmental conservation technology, (6) institutional information, (7) information related to accidents, incidents, lawsuits, etc., and (8) other information.

3 Environmental System Committee, Japan Society of Civil Engineers ed., *Kankyo System: Sono Rinen to Kiso Shuho*, Kyoritsu Shuppan, 1998, p.95.

information is also highly specialized and considerable expertise is required to understand it.[4]

Figure 1-1. Concept of Environmental Information



Source: DBJ.

In executing environmental information policy centered on basic measures, it is therefore important how to collect and distribute environmental information, which is so unique in nature. Information technology is a useful tool in distributing environmental information.

In bringing about the aforementioned shift in the paradigm of environmental administration, the traditional viewpoint of "businesses vs. residents" should be complemented by the perspective of "the government vs. the private sector (including businesses)" to ensure appropriate environmental information sharing among governments (local authorities), businesses and residents. The following section examines the current status of environmental information sharing.

2. Current Status of Environmental Information Distribution

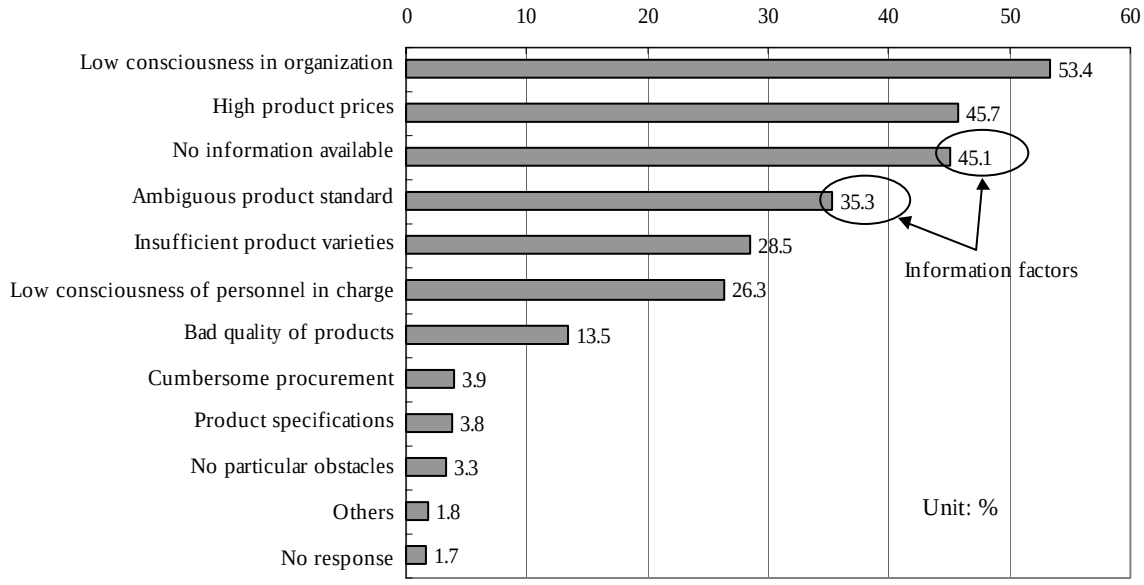
At the level of local authorities, which are expected to become important actors in environmental information policy, collaboration between the public and private sectors involves obstacles.

For example, a large number of organizational and cost-related problems have been pointed out as regards the Green Procurement Law[5], which has been fully implemented since fiscal 2001. A questionnaire survey indicates the lack of product information in green procurement, as many local governments responded that "no information is available" or that "product standard is ambiguous" (information from businesses to governments).

[4] "Uncertainty" should also be noted as contributing to the complexity and specialty of environmental information. Toxicity itself may change with the sophistication of technologies and research. Some factors, such as soil pollution, may only be recognized at the time of redevelopment. The collection and distribution of information on such factors need special consideration, because they must be treated as risks.

[5] Officially called "the Law concerning the Promotion of the Procurement of Environmentally Sound Supplies by Governments," the law aims at promoting the procurement of environmentally sound supplies, etc. by governments and facilitating the shift of demand toward information and other environmental supplies.

Figure 1-2. Negative Factors Affecting Green Procurement by Local Governments



Source: Environment Agency, "Questionnaire Survey on Green Procurement by Local Governments," autumn 1999.

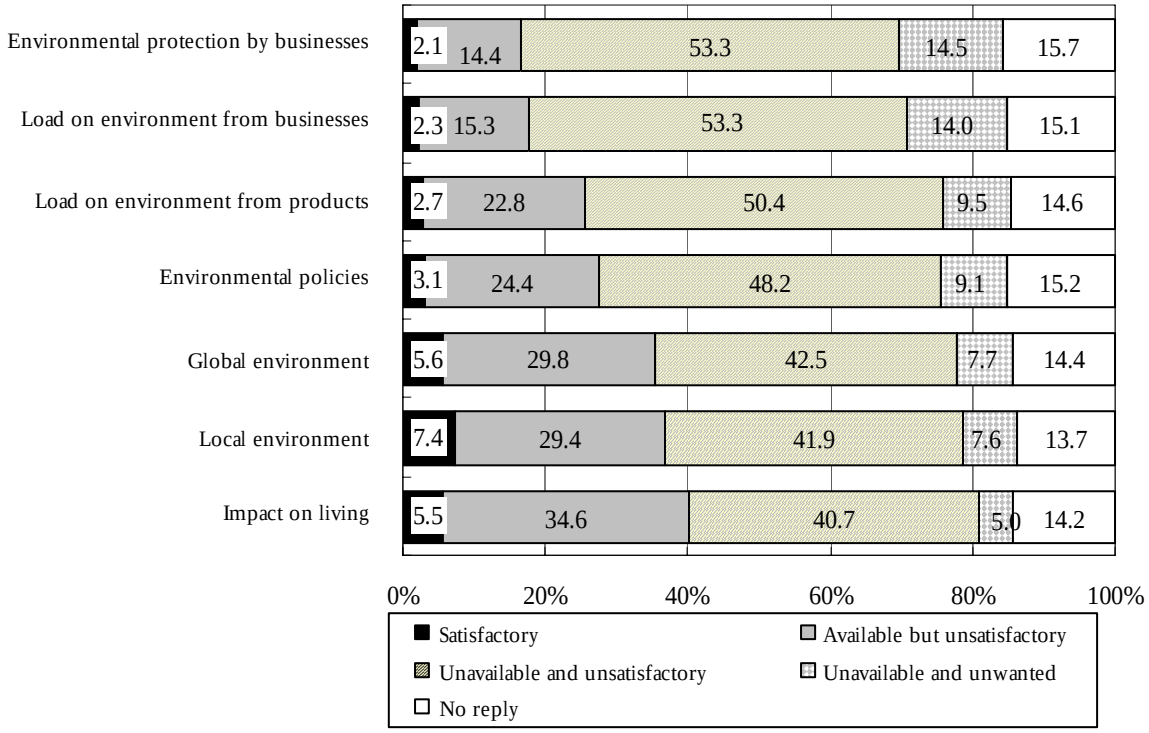
Other examples indicate the lack of information on the condition of soil pollution, the impact of environmental pollution on human health, etc. As regards soil pollution, some local governments have disclosed information on incidents of soil pollution on websites. In addition, institutional designs concerning soil pollution have been provided for in ordinances. Nonetheless, the efforts are still far from being completed (environmental information from governments to residents or from businesses to residents).

Figure 1-3. Examples of Recent Soil Pollution Incidents in Tokyo

Business establishment	Condition of pollution	Made public in
Former Tokyo Gas Omori Plant	Arsenic level in groundwater was 1,700 times as high as environmental quality standard, etc.	Jan. 2001
Nisshinbo Industries Tokyo Plant	Six items including the levels of lead and arsenic exceeded environmental quality standards or reference values.	Jan. 2001
Nissan Motor Ogikubo Plant	Trichloroethylene level was 1,653 times as high as environmental quality standard, etc.	Sep. 2000

Source: Compiled by DBJ from Tokyo Metropolitan Government homepage.

Figure 1-4. Availability of Environmental Information to Residents



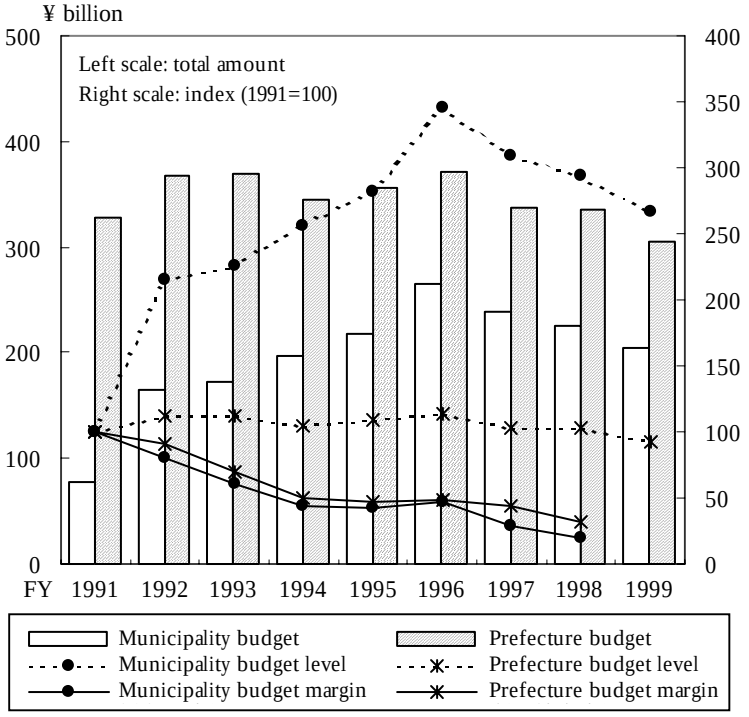
Source: Environment Agency, "Survey on Sound Lifestyle" (March 1998).

Conversely, residents as providers of opinion have increased their demand for information, mainly on the impact of environmental policies and problems affecting their lives. Such information is essential if residents are to change their status from mere receivers of information to independent actors in environmental protection, because it enables them to urge local governments or businesses to take action based on actual conditions of the local environment (environmental information from residents to governments or from residents to businesses).[6]

In financial terms, the total amount of environmental budget has been declining as local governments are forced to cut back spending as a whole.

[6] This was illustrated by the response of residents to media reports on dioxin-polluted vegetables in Saitama Prefecture. Swift and proper action by the governments or parties concerned is indispensable in such cases.

Figure 1-5. Trends in Environmental Conservation Budgets of Prefectures and Cabinet Order-designated Municipalities



Note: "Margin" indicates an index (level) on fiscal 1991 (=100) of the surplus (ordinary) budget source ratio, which is calculated as 100 – the ratio of current expense to current income.

Source: Compiled by DBJ from Local Environmental Conservation Measures, White Paper on Local Finance, etc.

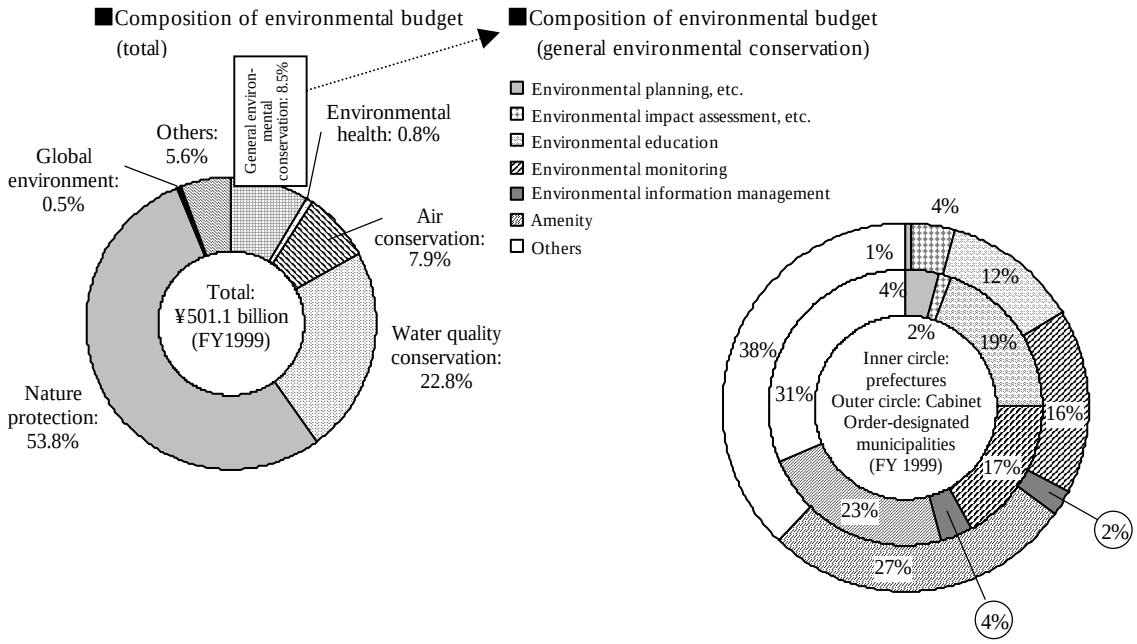
Of the total budget related to environmental measures, "direct" management of environmental information accounts for only a small share.[7] Under the "general environmental management" heading, which accounts for 8.5% of total environmental budget, "environmental information management" represents only about 4% in prefectures and 2% in Cabinet Order-designated municipalities. Although other expenses may be regarded as measures related to environmental information in a broad sense, as described above,[8] it can be concluded that the policy measures falling under the heading of environmental management budget account for merely 0.3% of total environmental budget.

As local governments will have to reconstruct their finances under increasingly difficult conditions, environmental administration will need to be financed more efficiently.

[7] As regards expenses related to environmental conservation, it has been pointed out that different local governments are involved in different activities, that investment expenses and maintenance expenses are not clearly separated, that field expenses are not sufficiently distinguished from management, and that the compilation of data is adversely affected by the vertical division of the government sector. See Imura and Niwatari, "Jichitai ni okeru Kankyo Kaikei no Donyu to sono Igi", *Chiho Zaimu*, Gyosei, November 1999, pp.5-7.

[8] For example, the atmospheric conservation budget of Iwate Prefecture (as of fiscal 1999) includes policy measures such as "environmental monitoring research on PCDDs" and "research on hazardous air pollutants."

Figure 1-6. Composition of Environmental Budget and Environmental Information Budget



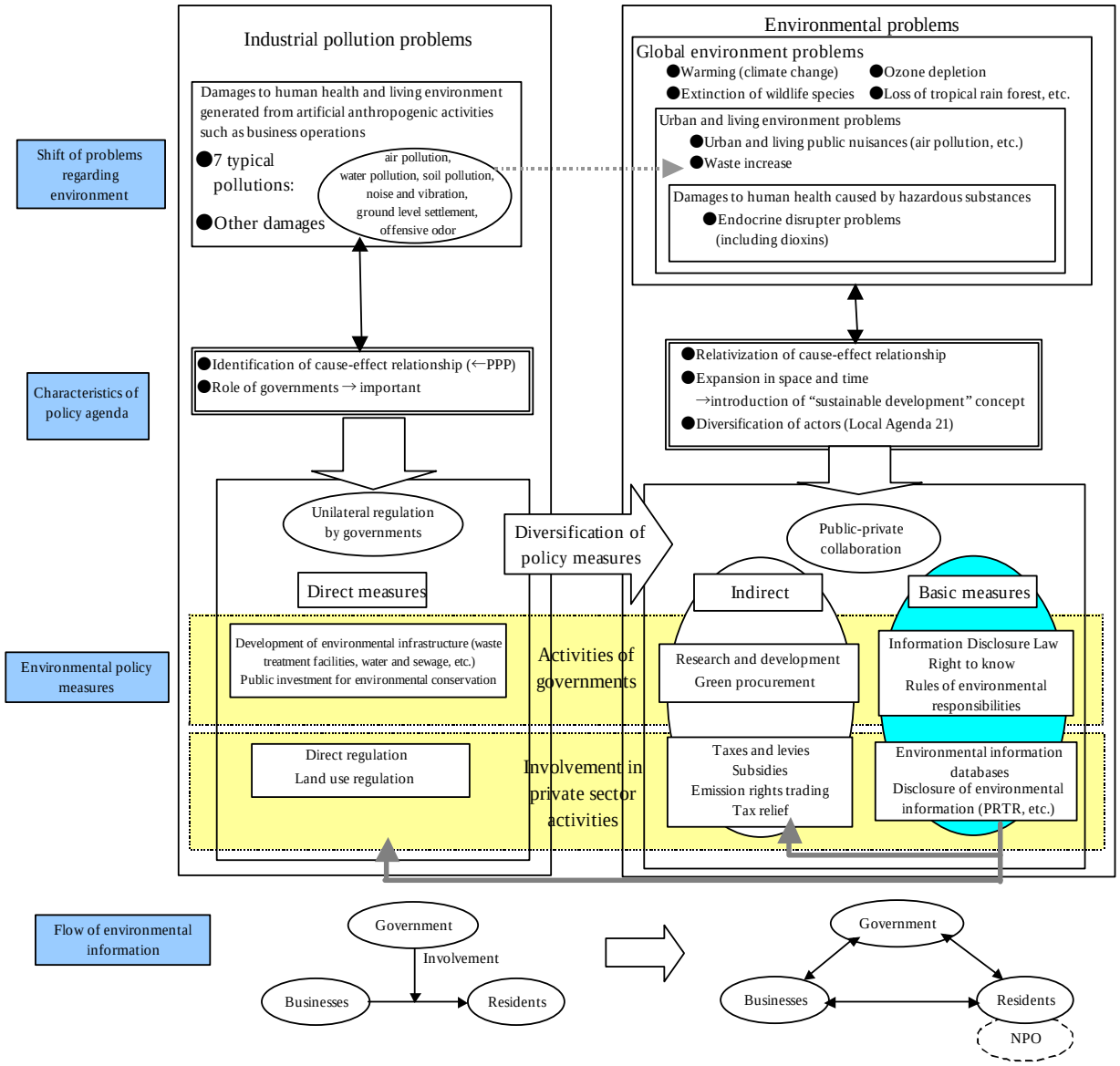
Note: Total of prefectures and Cabinet Order-designated municipalities.

Source: Compiled by DBJ from Local Environmental Conservation Measures, White Paper on Local Finance, etc.

Thus, the aforementioned shift in the paradigm of environmental administration requires the closing of the environmental information divide not only from the traditional viewpoint of "businesses vs. residents" but also from the perspective of "the government vs. the private sector (including businesses)," as well as efficient sharing of environmental information among the government (local authorities), businesses and residents.

The following chapter examines how environmental information policy has developed overseas.

Figure 1-7. Shift toward Environmental Problems and Changing Policy Measures



Sources: Ueda, "Kankyo Keizaigaku," Takegahara, *JDB Research Report No. 93*.

II. Environmental Information Policy and Utilization of Information Technology in Europe and US

This chapter outlines innovative environmental information policy measures in Europe and the United States. Trends in the US will be described first, focusing on the Superfund Act on soil pollution administered by the EPA and developments in environmental administration at the state level, which reflect the diversity and complexity of environmental information. This will be followed by an overview of legislation and systems concerning environmental information policy mainly in Nordic countries. Finally, the discussion will turn to German legislation, which aims at systematic institutional development prior to the construction of environmental information databases.

1. Environmental Information Policy in the US

1.1. Movement of Environmental Information Policy by Environmental Protection Agency (EPA)

1.1.1. Relationship between government reinvention and environmental information policy

In the United States, the EPA is in charge of environmental administration at the federal level, as well as the development of infrastructure that also serves as the basis for environmental information policy. US environmental administration is characterized by its focus on environmental information for carrying out the administrative reform initiated by the Clinton administration in 1993, which consists of government reinvention and National Performance Review.

The Clinton administration, formed in 1993, called for "reinventing government" through National Performance Review (NPR), which led to many reports on how to undertake NPR. One of the reports entitled "Reengineering Through Information Technology" put forward the concept of e-government. The e-government initiative, considered as an important means of reinventing government, is designed to ensure accountability and increase openness in decision-making by improving government services and realizing efficient and effective administration.

The government reinvention and the e-government initiatives also impacted on environmental information policy. Under the direction of the administration, Carol M. Browner, then Administrator of the EPA (1993-2001), dispatched over 50 personnel to the NPR team, which was directly placed under the President, to help reinvent the government, and ordered them to reform environmental regulations in line with the reengineering of the whole government. As a result, environmental information policy was coordinated with the entire movement toward reinventing the government.

1.1.2. Development of environmental information policy

The reform of environmental regulations was based on the following five principles: (1) improving environmental information, (2) flexibility, (3) building partnerships, (4) facilitating compliance with improved availability of information on environmental regulation, and (5) cutting red tape. Under these principles, the EPA, building on the partnership between the public and private sectors as well as between federal and local governments, has been actively implementing institutional reform as top priority in improving environmental information policy.

Above all, the first principle – the improvement of environmental information – is deemed most important in promoting regulation reform. Why is this? The 1970s were marked by

deteriorating pollution and the emergence of environmental protection systems. Since information technology was underdeveloped at that time, policies were focused on individual environmental media. Also, separate environmental (pollution control) regulations were institutionalized for individual emission substances. Now that modern information technology has enabled an environmental policy to address multiple media, however, a new regime is required to cope with environmental problems. Examples such as community-based environmental protection and sector-based approaches entail the reutilization of accumulated data. That is, the disconnects need to be bridged between the traditional environmental information databases established for individual environmental media and the current databases covering multiple media. At the same time, accumulated data should be maintained both quantitatively and qualitatively, and new methods of data analysis need to be established.

The improvement of environmental information is led by the "reinventing environmental information" program. This program is based on the observation that the time lag between the collection and reporting of environmental data delays the response of the government, and that the lack of a common data protocol (standard) between databases covering individual media, such as air and soil, hinders comprehensive cross-medium environmental assessment.

In order to address these problems, a three-pronged policy has been developed comprising (1) the development of data systems based on real-time monitoring systems for environmental information, (2) the simplification of applications for environmental permissions and approvals, and (3) the realization of cross-medium analysis through the standardization and integration of data. Necessary regulation reform to cope with this policy agenda envisages using information technology.

Building on cooperation and tie-ups between the federal government, state governments, local governments, universities, businesses, NGOs, etc., strategic measures implemented so far include: (1) the exchange of environmental data between individual entities, (2) the interpretation of environmental data and the integration of data that have been developed and accumulated individually, (3) the expansion of chemical substances and emission source data covered by the Toxic Release Inventory and the examination of measures for ensuring report compliance obligations, and (4) the establishment of an external supervisory organ to check the compliance, etc. of regulated facilities. In order to ensure the effectiveness of these measures, a Center for Environmental Information and Statistics (CEIS)[9] has been established. Also, the Environmental Monitoring for Public Access & Community Tracking (EMPACT)[10] initiative has been institutionalized to help local governments construct monitoring systems.

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[9] The CEIS is currently integrated with the Office of Environmental Information (OEI), to be described later.

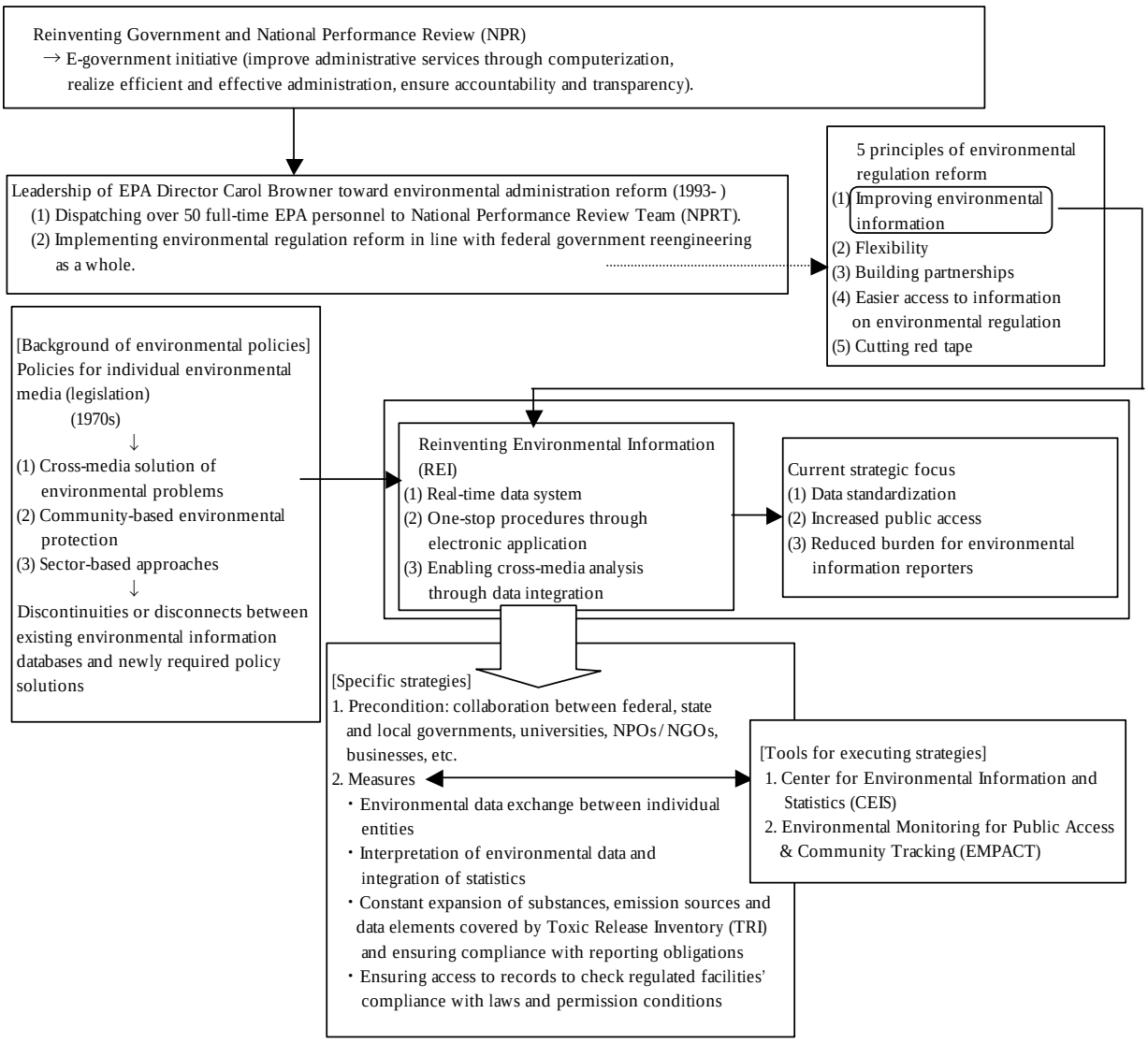
[10] (1) Objectives: (i) provision of precise environmental monitoring data, (ii) provision of real-time (or periodical) data, and (iii) provision of useful information for decision-making (provision of so-called metadata).

(2) Requirements for subsidized projects: (i) local governments located in the EMPACT Metro Area (urban areas with populations of 100,000 or more, or major cities with populations of 50,000 or more), (ii) technological innovation potential for real-time monitoring of environmental indicators → dissemination of Web-based technologies (HTML, etc.), data management and security technologies, (iii) appropriate information management, procedure and communication techniques, timely provision of information for residents, (iv) involvement of stakeholders (communities, chambers of commerce and industry, local businesses) in the form of consortiums combining the industrial, academic, public and private sectors, etc.

(3) Example – Massachusetts

- AIRNOW: timely information concerning air pollution and its impact on health.
- Provision of information and data on ozone and toxic particulates.
- Charles River Cleanup Movement 2005: periodical research on bacteria, eutrophication and heavy metals.

Figure 2-1. Reinventing Government Program of US Federal Government and Development of Environmental Information Policy by EPA



Source: DBJ.

Basic systems are recognized as being important for environmental information policy. In general, environmental information tends to be thought of in terms of data, such as polluted sites, types of pollutant and the status of pollution removal in the case of soil pollution. When using environmental information, however, it is crucial to decide what data should be collected when and how, before actually starting to collect information. In the US, such issues have been discussed in both the public and private sectors, and the results have been useful in constructing environmental information systems.

The following subsection examines the basic systems and schemes on which the implementation of such policy measures depends.

1.1.3 Environmental information systems: basic systems

Within the EPA, the Office of Environmental Information (OEI), established in 1999, is in charge of the collection, management and disclosure of environmental information. The focus is on collecting quality environmental information[11]. The Office is also in charge of efficiently collecting environmental information by integrating information, strengthening information partnerships beyond the borders of existing sectors such as public and private (businesses, citizens, NPOs), and reducing the burden of environmental information collection.

The basic systems related to collecting environmental information in which the OEI is involved are 1) systems for collecting environmental information, 2) subsystems for improving the "quality" of environmental information itself, and 3) systems for ensuring smooth dissemination of environmental information.[12] The following section describes in detail three typical systems included in 1) above.

Figure 2-2. Outline of Basic Systems for Environmental Information Collection in the US

Objective/function	Name of system	Function
Collection of environmental information	Central Data Exchange	Information on EPA budgets and policies related to the promotion of electronic applications
	Environmental Data Registry	Comprehensive information source concerning the usefulness, sources and location of environmental data
	Chemical Registry System Biology Registry System	Reference tools for accessing all records on chemical substances, ecologies, etc. recognized by EPA data systems
	Terminology Reference System	Common information source for general terms and definitions related to the EPA
	Information Collection Requests	Standard to be followed by the EPA when collecting administrative information from the public
Ensuring the "quality" of environmental information	Data Standard	Common standard to prevent disruptions in EPA regulations, reporting requirements and databases
	EPA's Quality System	Policies and procedures concerning quality control of EPA's environmental information
Smooth distribution of environmental information	Facility Registry System	Directory for increasing public access to facility data related to EPA regulations
	Geospatial Information	Information database integrating GIS, remote sensing and visualization
	Guide to Federal Environmental Information and Statistics	National directory of environmental information collected, analyzed and published by the federal government
	Locational Data Improvement Project	Designed to improve locational data (latitude and longitude) of environment-related facilities, etc.
Disclosure of environmental information	FOIA (Freedom of Information Act), etc.	

Source: Compiled by DBJ from EPA homepage (http://www.epa.gov/oei/collecting.htm).

The EPA is constructing a Central Data Exchange (CDX) to help public utilization of environmental information including data processing after information collection and the disclosure of information. The CDX, to be constructed in three years starting from 2001, will

[11] In order to improve the quality of environmental information, the EPA developed an Integrated Error Correction Process (IECP), which has been operational since May 2000. Stored in the Environmental Facility Information system (http://www.epa.gov/enviro), the IECP is one of the 11 main data systems of the EPA.

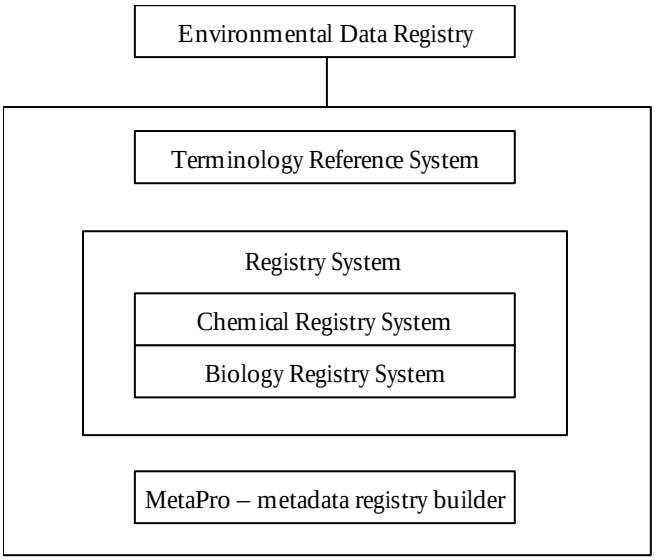
[12] In addition, legislative schemes such as information disclosure serve as subsystems to support the three elements (to be described later).

enable private operators, etc. to submit most of the legally required data electronically via the Internet to the EPA.

An Environmental Data Registry Portal (EDR Portal) has been developed to facilitate users' access. This portal site serves as the "entrance" to environmental information, providing metadata[13] to users. Through the EDR Portal, users can extract data on individual substances recorded in the Chemical Registry System (described below) and the Biology Registry System: BioRS), and obtain detailed information.

The Chemical Registry System (CRS) is accessible not only to regulating authorities and departments of the federal, state and local governments involved in environment-related decision-making, but also to a wide range of stakeholders including residents and corporate system engineers, although certain authorizations are required. By typing in the name of a chemical substance and the ID number of the substance on the Internet, users can obtain technical information on handling of the substance, download the chemical identification data which are standardized or integrated by the regulating authorities, and obtain other relevant information such as the composition and mass of each chemical substance.

Figure 2-3. Relations of Systems Operated by OEI



Source: Compiled by DBJ from EPA homepage.

The above three systems allow corporate users to efficiently exchange (send and receive) government environmental information related to regulated substances "electronically" through "one entrance."

The various systems are supported by legislation. Although there is no specific disclosure scheme for environmental information, as in the case of Germany, the US federal government, based on the general disclosure scheme under the Freedom of Information Act, is developing and enhancing the dissemination system for environmental information, while maintaining the quality of data by consolidating data standards, etc.

[13] Metadata refer to data concerning the forms and contents of substantial data. They indicate which data are recorded on the database in which forms.

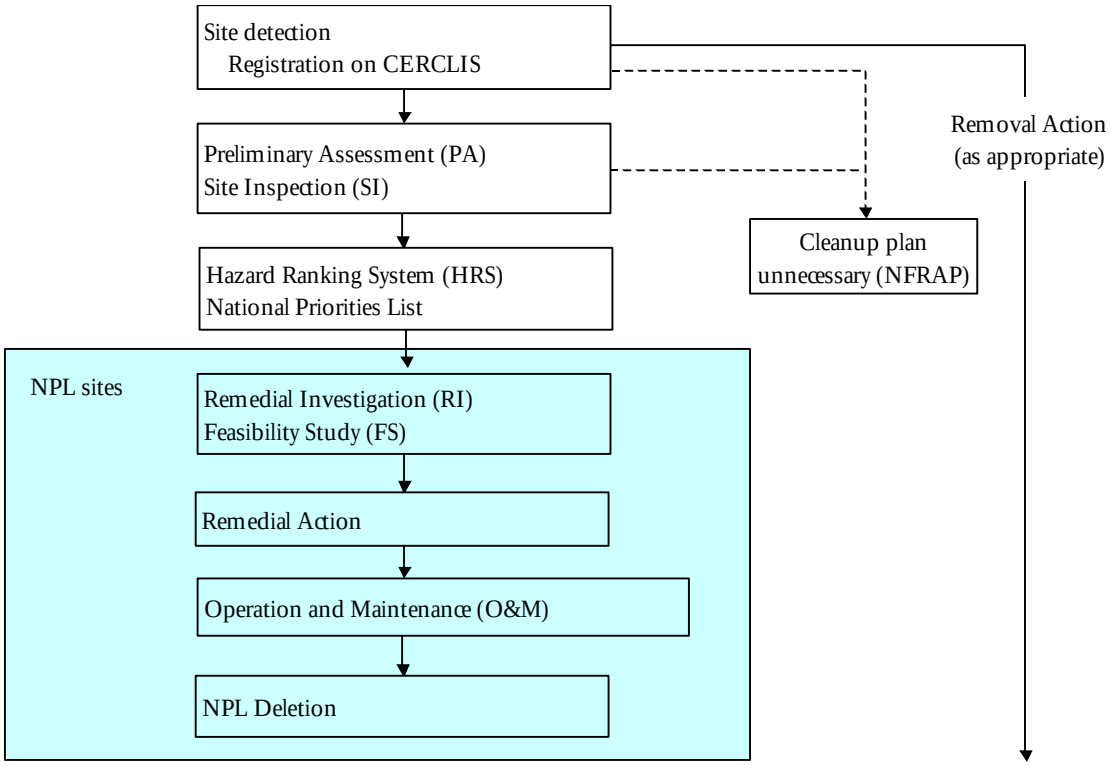
1.1.4. Example of environmental information systems – systems related to soil pollution[14]

The US has in place a Superfund Act as a legal system to control soil pollution. The Superfund Act refers to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 and its reauthorization laws.

The Act provides as follows regarding soil pollution information, which is part of environmental information. The EPA conducts an assessment on any potentially polluted site that is newly discovered. If the EPA decides that an inspection is required, the site is registered on the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS). This environmental information system is effectively a database that contains an exhaustive list of potentially polluted sites.

The EPA conducts a Preliminary Assessment (PA) on the sites listed in the CERCLIS, which is supplemented by a Site Inspection (SI) as necessary. The extent of risk is quantified according to the Hazard Ranking System (HRS[15]). Those sites assessed as exceeding a certain level of quantified risk are registered on the National Priority List (NPL). The NPL sites are to be covered by subsequent remediation measures.

Figure 2-4. Soil Pollution Cleanup Process under Superfund Act and Environmental Information Databases



Source: *DBJ Research Report No.6* as revised.

[14] For details of the US Superfund Act, see "Current Status and Future Perspective of the Japanese Remediation Industry," *DBJ Research Report No.6*, October 1999. This subsection partially cites the said report.

[15] The present HRS, revised in December 1990 (Federal Administration Notice 40CFR PART 300/Appendix: A), indicates the level of danger, calculated as the risk of indirect exposure to hazardous substances for groundwater, surface water and air, and as the risk of direct exposure to hazardous substances for soil.

NPL sites may be registered in three ways: (1) HRS evaluation as exceeding a certain level of pollution risk, (2) regardless of HRS evaluation (score), designation of a state or a certain area as a top-priority site, and (3) satisfaction of three specific requirements[16].

The important point is that a database has been developed that covers the sites formerly registered on the CERCLIS but subsequently deleted from the inventory. Such sites are called Archive Sites (NFRAP). The NFRAP includes those sites on which assessments were conducted according to the Superfund Act procedure but for which remedial action was judged by assessments to be unnecessary.

Thus, there are three databases related to the Superfund Act: CERCLIS, NPL and NFRAP. In principle, they are all made public on the Internet and it is possible to view the contents of the sites as necessary.

1.2. Environmental Information Policy at the Local Area

This subsection examines how environmental information policy is implemented at the local level (state or below). In the US, the federal government generally provides legal frameworks at the national level that go beyond the boundary of a single local government such as state and municipality, while state governments enact individual laws and regulations that suit specific local conditions. The same applies to environmental administration. Through the establishment of stricter or broader local laws, each local government has a variety of regulatory measures and permission/approval procedures to take local specificities into consideration.

Such schemes and procedures are largely made public through information technology. Many states are actively collecting environmental information in a narrow sense, as mentioned earlier. Most of the data are available on the Internet. The characteristics of environmental information policy in five typical states are shown in Figure 2-5.

Take California as an example. The California Environmental Protection Agency (State EPA) has established environmental indicators and protocols to create a common set of indicators to evaluate environmental performance. As regards information technology, the State EPA has been involved in the networking of databases with local municipalities to collect environmental information and to build a statewide environmental information database. Active involvement of the private sector can also be observed: major firms including IBM have helped to construct this environmental information database. The database coverage is very broad, ranging from information on the environmental performance and compliance of each local firm to information on pollution control technologies.

[16] a. The Agency for Toxic Substances and Disease Registry (ATSDR) of the US Public Health Service has recommended declaring the site off limits on the ground that such exposure may cause adverse effect on health;
b. The EPA itself has confirmed the risk of serious effect on public health; and
c. The EPA has determined that a specialized removal organization that only operates on NPL sites is more cost-effective than its own division in charge of emergency removal.

Figure 2-5. Main Contents of Environmental Information Collected, Managed and Published on Web at the State Level

State	Schemes under environmental laws	Individual environmental measures	Environmental permission/approval procedures	Original monitoring systems	Related to Superfund Act	Others
Massachusetts	○	○	○	Air – displayed by area	—	
Florida	○	○	—	Ozone-related data	Brownfield	
New York	○	○	○	—	Original measures	
California	○	○	○	Environmental indicators developed	—	E-procurement
Michigan	○	○	○	—	Original measures	

Sources: Compiled by DBJ from state homepages.

Figure 2-6. Environmental Information Policy Project of California Environmental Protection Agency (State EPA)

- Codified by a House law (1999). Designed to improve environmental performance in both the public and private sectors and to develop environmental protection programs initiated by the general public.
- Clarification of burden sharing between the public and private sectors.
  State EPA → Definition of environmental information data protocols and data collection, technical support, support for inputs to national databases, coordinating function for working groups consisting of the industrial, academic, public and private sectors.
- Collection and provision of information via IT → environmental performance, compliance, pollution control technologies, alleviation of environmental burden, involvement of employers and stakeholders, quantitative and qualitative value of information provided for residents, information on the cost-effectiveness of environmental management.
- The development of basic protocols is coordinated with the federal EPA but also considers the adoption of locally specific protocols and environmental indicators. Data are transmitted to, and stored in, the federal EPA databases through collaborating local universities.

Source: Compiled by DBJ.

The US environmental information policy thus has a delicate balance between centralized elements and decentralized elements. The federal government has been developing basic legal systems and environmental information databases that support the systems, while maintaining close working relationships with state and local governments, which are major actors in environmental administration. Also building on such collaboration, each local government implements its own environmental information policy. As regards the utilization of information technology, it should be noted that, based on the recognition of the need to ensure active disclosure of environmental information, the industrial, academic and public sectors work together at the local level, with logistical support from the federal government.

2. Trends in Europe

This section outlines trends in environmental information in European countries.[17]

2.1. Environmental Democracy, Corporate Activities and Environmental Information Policy

The general trend is toward the development of environmental democracy, a framework for active involvement of citizens in environmental administration. Thus, the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (also known as "Aarhus Convention")[18] took effect in late October 2001, with signatures of over 40 countries, mainly in Europe. As its name indicates, the Convention is designed to promote (1) access to environmental information, (2) public participation in decision-making in environmental matters, and (3) access to justice.

The first element, i.e. access to environmental information, includes both passive access and active access. The former refers to the right of a citizen to access environmental information owned by the government, while the latter means the obligation of the government to collect and publish environmental information. Although its intent is similar to that of the US Freedom of Information Act (FOIA), the Convention regards active access as an "obligation". The second element, which is participation in decision-making, comprises various stages including (1) participation in decision-making concerning government activities that are expected to have serious impacts on the environment; (2) participation in public policy-making processes (land use planning and industrial planning, for example); and (3) participation in the preparation of draft regulations.[19]

Figure 2-7. Main Provisions of Aarhus Convention

Article 1	Objectives
Article 2	Definitions
Article 4	Access to environmental information
Article 5	Collection and publication of environmental information
Article 6	Public participation in decision-making related to specific fields of activities
Article 7	Public participation in environmental planning, programs and policies
Article 8	Public participation in the preparation of administrative regulations and general legislative regulations
Article 9	Access to justice

Source: Compiled by DBJ.

The Council of the Organization for Economic Cooperation and Development (OECD), whose membership includes many of the European countries, adopted Council Recommendations on Environmental Information to ensure the disclosure of environmental information owned by the public sector, businesses, etc. under certain conditions and to promote the collection, preparation and publication of environmental information data, environmental indicators and related economic statistics.

Recent trends in corporate activities are also related with environmental information. Important factors in this regard include databases concerning the emissions and movement of

[17] Despite an institutional framework of the European Union, it is arguable whether the West European countries may be regarded as an entity when it comes to environmental administration. It should be noted here that this report focuses on unique measures in selected countries rather than on the characteristics of environmental information policy measures in Europe as a whole.

[18] 25 June 1998.

[19] Akihiro Amano, "Kankyo Minshushugi no Choryu," in Nikkei Sangyo Shimbun *Kankyo no Ronten*, November 26, 2001, p.11.

chemical substances (PRTR, etc.), which form part of toxicity related information, and environmental information related environmental management. EU countries have started to switch from the traditional regulatory type of administration to public-private collaboration-based administration. Information distribution has been promoted through common public-private platforms using information technology.

The following sections present useful case studies from the two viewpoints of environmental democracy and focus on relationships with corporate activities.

2.2. Collaboration of Industry, Academia and Government in Environmental Information Policy in Finland and Sweden

2.2.1. General

Looking at the two Nordic countries (Finland and Sweden), they are both developing e-government with information technology to improve not only efficiency but also convenience in view of the harsh climate, etc. In environmental management, they have developed environmental codes that also are written into their Constitutions, based on the Integrated Pollution Prevention and Control Directive (IPPC) directive and according to the concept of sustainable development. Finland has modified existing laws and regulations, accompanied by revisions to the Constitution as necessary. Sweden also established an Environmental Code in 1999, after consolidation of existing environmental laws and regulations. Reflecting the difference in population and industrial intensiveness, however, the two countries slightly differ in their attitude toward environmental information policy. The following sections outline the current status of environmental information policy in the two countries.

2.2.2. Finland

Environmental information policy and organizational regime

In 1995, Finland revised Article 14a[20] onwards of the Constitution (effective since July 17) to declare itself an environmental nation. Disclosure of environmental information is a constitutional right recognized in Paragraph 4 of the Article. Under the Constitution, an Act on the Environmental Administration was passed in 1995 to guarantee the supply of environmental information from the public sector, raise public awareness of environmental problems and ensure efficient and effective environmental administration. As units to facilitate environmental administration, Regional Environment Centers and Finnish Environment Institute (FEI) were to be created under the auspices of the Ministry of Environment (Article 2, Paragraph 1 of the Act). Regional Environment Centers and FEI are also responsible for the management of water resources, under the supervision of the Ministry of Agriculture and Forestry (Paragraph 1 of the same Article)[21].

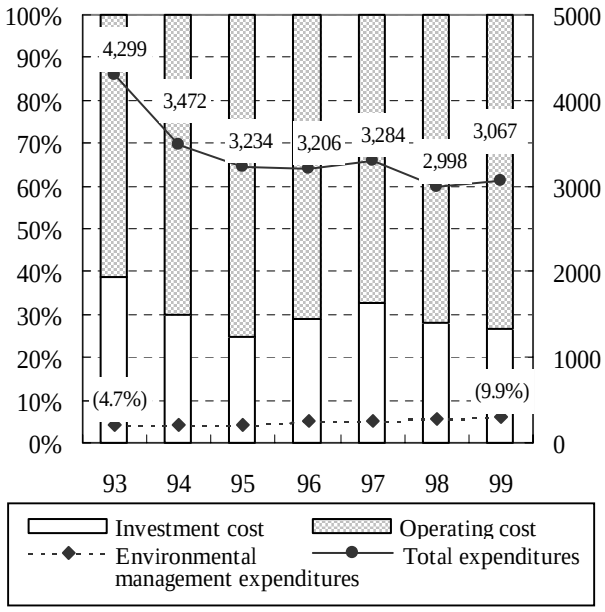
Although total expenditures related to environmental administration in Finland dropped from M.4.3 billion (about ¥85 billion) to M.3 billion (about ¥60 billion), the share of operating cost has been rising while that of capital cost has declined, as environmental infrastructure in the country is already well-developed. The share of expenditures for the management of environmental information systems, etc. rose from 4.7% in 1993 to 9.9% in 1999, implying the

[20] Article 14a. (1) The task of conserving nature, biodiversity, the environment, and cultural heritage shall be carried out by all persons. (2) The government sector shall make every effort to ensure that all persons enjoy opportunities to participate in decision-making on the present environment as well as the right to a healthy environment.

[21] It should be noted that all sorts of administrative information, not only environmental information, have been accessible to the public in principle for many years in Finland. As a rule, all information other than military information and information related to corporate core competence shall be made public “immediately” and “entirely.”

software-oriented environmental administration is progressing, the contents of which are examined next.

Figure 2-8. Expenditures related to Environmental Protection in Finnish Local Governments



Note: The left scale measures the shares of investment cost and operating cost, and the right scale measures the amount of expenditures in markka. Figures in parentheses ( ) for environmental management expenditures for 1993 and 1999 are as percentages of total expenditures.

Source: Compiled by DBJ from "Finland's National Resources and the Environment 2000," p.13.

Environmental administration authorities in Finland recognize that environmental information is not evenly distributed and that asymmetries of information tend to occur between residents and businesses and between residents and the government in particular. Therefore, a process has been developed to produce environmental information and circulate it among policy-makers (Parliament), the government, business managers, educators, residents, etc. Typically, FEI and Regional Environment Centers, working with the Ministry of Environment, implement environmental information policy in unison with local communities. Priorities include environmental research at the national level and technology transfer to the private sector, based on nationwide monitoring of the environment. As described later, cooperation between the government and private companies include environmental information technology development programs led by FEI, which provide relevant support for private companies.

At the local level, 13 Regional Environment Centers[22] have been established to help local governments smoothly implement environmental policies and to collect environmental

[22] Regional Environment Centers prepare and implement regional environment planning and promotion programs and assume administrative works in receiving subsidies from the EU Structural Fund (Article 7 of the Cabinet Order concerning Regional Environment Centers).

information[23]. Environmental Action Databases are also being constructed, collecting and analyzing data on corporate environmental investment and its cost-benefit ratio. The databases identify environmental cost for businesses on a capital basis as well as on a cost basis, and serve as a software infrastructure to analyze the most reasonable corporate behavior in relation to the environment. Although the data have not been made public as they relate to the behavior of individual companies, the databases are expected to be made open to the public in the future. Regional Environment Centers are playing a leading role in the development of such databases, as it is required to reflect properly local specificities such as the status of business concentration in each region[24].

Even in Finland, various systems related to environmental information are still under construction. It is however important that, while the concept of development is elaborated by the government (FEI in particular), active outsourcing has been introduced in the production of programs and the maintenance/management of systems. Efforts have been made to reduce initial cost through commissioning to private companies and to control the risk of obsolescence of the systems.

Environmental monitoring

Environmental information used for environmental administration is collected through environmental monitoring programs and data systems. Finland has more than 70 monitoring programs, which are implemented by FEI, local governments and local universities, with the support of five central ministries and agencies[25]. Furthermore, local universities are participating in long-term monitoring programs, cooperating in the development of new environmental monitoring techniques. Based on the Polluters Pay Principle (PPP), private companies are obliged to monitor the quality of emission substances and their impact on the environment. These obligations are stipulated in the Air Pollution and Water Quality and Waste Disposal Laws.

Although monitoring programs have been implemented by the Ministry of Environment since 1985, the programs are being reviewed as they became partially outdated, and new monitoring strategies[26] are being developed. The success of these measures is supposed to

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[23] Nonetheless, the development of regional environmental policies is mandated to individual local governments, and consultation with, or involvement of, the central government happens rarely if at all (no agreement with the policy on municipalities). On the contrary, an appeal may be filed with an administrative court, etc. against the central government for any unreasonably strong involvement. Regional Environment Centers function solely under the co-operation between provinces and local authorities (Article 5-1 of the Environmental Administration Law).

[24] The Local Environmental Administration Law (passed in 1986) is applicable to the environmental administration of local governments. Article 2 defines the functions of the Centers, providing that they shall facilitate and support environmental protection policies implemented by local governments. Environmental obligations of local governments are provided for in Article 3. A commission (composed of local government representatives) shall mandate field personnel with the development of basic plans on environmental protection (Article 4). In addition, a Local Environmental Protection Committee shall be organized to help implement concrete environmental protection operations (Article 5-1). The functions of the Committee include, but are not limited to, the tasks specifically stipulated in the Air Pollution Law, Waste Disposal Law, Water Resource Law and other environmental laws and regulations, as well as the monitoring of the environment and related survey and research (Article 6). The Committee reserves the right to express its opinion on any important decision-making by local governments concerning the environment (Article 10-2). The Committee is guaranteed access to environmental information to ensure the effectiveness of its activities (Article 11).

[25] While FEI has a central role to play in environmental information monitoring, other organs are also involved in environmental monitoring, keeping close contact with FEI. Those organs include Finnish Meteorological Institute (research on air pollution), Finnish Forest Research Institute (research on forest resources, biodiversity and health), Finnish Game and Fisheries Institute (research on biodiversity), Geological Survey of Finland (survey on infrastructure and soil) and Marine Research Institute (marine research).

[26] They include 1) the definition of environmental monitoring in a new environment; 2) assessment on whether the present environmental monitoring programs have been able to provide proper information on unfavorable environmental conditions, and the suggestion of ways to improve the effect of monitoring action; and 3) assessment on the current use of environmental information and the suggestion of measures to improve the usefulness of data and increase access to environmental information.

depend on better access to environmental information, as well as on the legal definition of, and tighter regulation on, monitoring activities conducted by various actors.

Local environmental information management systems

Local governments have an important role to play in the monitoring systems. Therefore, environmental indicators for sustainable development have been developed, led by the Ministry of Environment. At the local level, the Ministry of Environment, the Finnish Association of Local Authorities and some local governments worked together to conduct research on a core set of environmental indicators, the results of which were published in 1994. The core set of environmental indicators has been evolving in economic, social and organizational terms.

2.2.3. Sweden

Since Sweden has more large-sized firms than Finland, environmental administration places greater emphasis on corporate activities in terms of both regulation and support. For example, research on product life-cycle assessment (LCA) has been advancing at the national level, and the practice of green procurement has been accepted widely. Information technology is increasingly utilized in environmental administration, including the launch of IT-based waste disposal systems. This section describes how environmental information networks have been constructed at the national level and what effects this network has had on local environmental information policy.

Building environment information network at the national level

In Sweden, Information and Communication Technology Commission (ICT Commission)[27] plays a major role in environmental information policy. ICT Commission, working with the Ministry of Environment and the Swedish EPA, makes policy recommendations, based on the idea that information technology not only represents an instrument for environmental monitoring and the supply of environmental information but also provides important opportunities that contribute to sustainable development. The functions of information networks have been attracting particular attention in environmental administration.

Environmental information networks built by the central government include *Svenska miljönätet*, a database of important environmental information with a search function. It has also put into practice a simulation system to detect long-term impacts on the environment using visual data from satellites. Thus, "dynamic" estimation has become possible concerning abnormal generation of plankton due to the eutrophication of lakes and the mixing of nitrogen compounds into crops.

Also, *Svenska Landtäckedata*, currently under construction, utilizes geographical information databases developed for the EU and accumulates information from satellites. It provides geographical information on land use and vegetation across the whole country. To be completed in 2002, it is considered to be the most extensive infrastructure initiative related to environmental information.

Local environmental information management systems

The construction of IT infrastructure at the national level also stimulates response at the local level. With the national geographical information system (GIS), some local governments already use simulation to estimate the impact of plant or building construction plans on the environment.

[27] This Commission is composed of nine members appointed by the government (led by the Swedish Ministry of International Trade and Industry). The current membership includes the Minister of International Trade and Industry, a private business manager, the Councillor of the Swedish Consulate at San Francisco and a professor of Stockholm University, among others. Its secretariat, headed by a Director, has seven full-time personnel.

For example, Malmöhus County (Commission) receives support from the national GIS-map program to investigate the cause-effect relationship between the health of residents and environmental degradation including noise, air pollution and soil pollution (particularly heavy metals). The environmental maps of the county provide three-dimensional data on the levels of noise and pollutant emissions. They are linked with the population register, already in electronic format, to identify the relationship of the data with population movements.

In the region of Skania, research based on Cabinet Orders (under the Code of Environment) has been integrated with the Statistics Sweden operation initiated in the regional Virtual Information Center to develop a system for environmental information management in the whole region. Combining environmental information with geographical information, this system supplies data on traffic and construction plans with environmental information and other related statistics in an integrated form through geographical information. The system is now utilized on a pilot basis in the 33 local governments belonging to the region of Skania. The data will be accessible in the future on the Internet.

Waste disposal systems utilizing information technology

In Sweden, the Waste Research Council, which includes representatives from business, academia and the government, has been involved in the development of systems related to waste disposal. Recently, two types of waste simulation model have been developed: "ORWARE" and "MIMES/Waste."

The ORWARE program is led by Professor Thomas Nybrandt (Agricultural Science Department, University of Sweden), working with Agricultural Engineering Institute and Royal Technology Institute. A model for the biological treatment of organic waste, ORWARE measures the environmental burden from waste disposal.

A demonstration test on this technology is being conducted in Uppsala. In Stockholm, the Environmental Protection Department uses this system to assess environmental burden in the case of waste incineration. The input data used for this purpose are based on the composition of the waste and the distance of transport to the waste disposal facility (storage yard). Variants of the model are created by choosing different disposal techniques – incineration, inorganic bioremediation, landfill and recycling. Environmental impact is assessed based on the results of these simulations. Thus, ORWARE is used to prepare environmental profiles and particularly to build complete waste disposal management systems at the level of local governments. As individual communities have their own local characteristics, the results have been accumulated through various types of simulation. The program is characterized by research on waste disposal management and recycling techniques across various types of industry and business[28].

MIMES/Waste, on the other hand, is a model of economic aspects, including the costs and benefits of waste disposal. This model also takes into consideration numerous environmental criteria. Because of its economic focus, however, MIMES/Waste is a model suited for cost-benefit analysis. This system was developed in Chalmers Institute of Technology.

[28] The importance of cross-industry recycling has also been pointed out in Japan (for example, Hidefumi Imura, Professor of post-graduate course, Nagoya University in "Kankyo Jichitai," pp.10-11, June 2001).

Figure 2-9. Environmental Administration and Environmental Information in Two Nordic Countries

Item	Finland	Sweden
(1) Environmental administration organs (national level)	Ministry of Environment, Finnish Environment Institute (FEI), Regional Environment Centers (13 centers nationwide)	Ministry of Environment, Environment Agency, other agencies
(2) Status of local governments	・Local governments develop their own environmental plans based on Local Agenda 21. ・The central governments and local governments work together through Regional Environment Centers (but autonomy is respected).	・Local governments develop their own environmental plans based on Local Agenda 21.
(3) Principal environmental legislation	—IPPC (EU Integrated Pollution Prevention and Control Directive — Constitution Article 14a as amended (1995) (1) Obligation of environmental conservation (2) Guaranteed right to participate in environmental administration and environmental rights ↓ Environmental Administration Law Environmental administration organs, functions of each organ, principle of collaboration with local governments, etc. (Autonomous Environmental Administration Law as subordinate legislation) ↓ Environmental Protection Law (2000) Consolidation of environmental permission/approval procedures, appeal and procedure for residents' participation	—IPPC (EU Integrated Pollution Prevention and Control Directive — Code of Environment (1999) (consolidation of 15 separate legal systems) (1) Land use standards (2) Environmental quality standards (3) Soil pollution (4) Treatment of chemical and biological substances (5) Genetic modification, etc.
(4) Characteristics of environmental administration	(1) Collection and provision of environmental information FEI to construct national environmental information databases and establish information collection systems through Regional Environment Centers. (2) Development of databases on soil pollution information. (3) Development of separate databases on corporate costs related to environment for investment and for expenses. (4) Development of local environmental indicators (Bio-Indicator Map) utilizing GIS. (5) Environmental information to be made public in principle. (6) Implementation of an Environment Cluster Research Program through business-academia-government collaboration including environmental information-related technologies (FEI).	(1) Active response to Lifecycle Assessment (LCA) → focus on environmental information. (2) Implementation of LCA through introduction of "Accredited Environmental Product Profile" scheme. (3) Active promotion of green procurement and examination of how to disclose product information. (4) Building environmental information networks → integration with GIS technology. (5) Research on environmental indicators. (6) Waste disposal system using IT and waste economic assessment system for waste administration both under construction.

Source: Compiled by DBJ from national Ministries of Environment data, etc.

Although these two systems still cannot be used under an open environment, future platforms are expected to be open to the public.

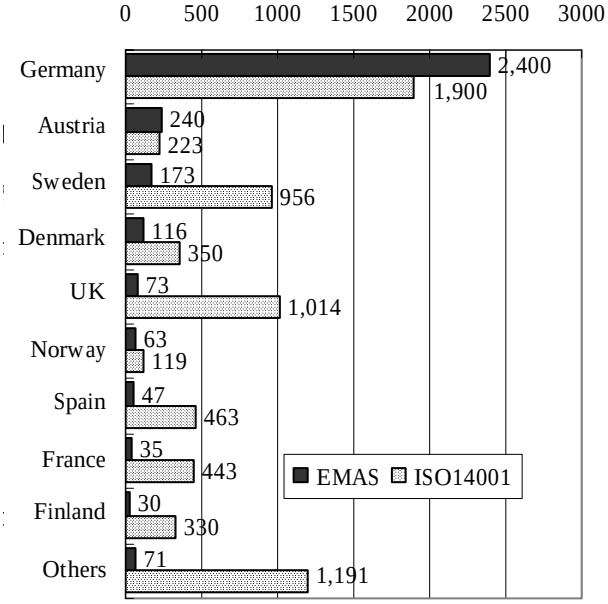
2.3. Local Version of EMAS in UK (LA-EMAS[29])

2.3.1. Factors behind introduction of LA-EMAS

This subsection describes the example of the UK, marked by innovative environmental management techniques at the local level.

The EU members are currently applying the EMAS, a developed version of ISO14001 that requires environmental performance to be measured by accredited auditors. This preemptive move in the field of environmental management has attracted attention recently.

Figure 2-10. Number of Environmental Management Certifications (as of February 2000)



Source: Compiled by DBJ from Finnish Ministry of Environment, "Finland's Natural Resources and the Environment 2000."

Partly because the EU law allows the application of EMAS to non-private companies including the public sector[30], efforts have been made in the UK to adopt EMAS in a wide range of local governments[31]. This is largely because LA-EMAS had been recognized as an effective tool for the preparation, implementation and operation of Local Agenda 21 (LA21). LA21 is an integrated cross-sector strategy or program for local governments, organically linking not only environmental aspects but also socio-economic aspects and other factors such as the quality of living. Economic performance, which serves as a measure of administrative behavior that also takes economic efficiency into consideration, may have been regarded as a useful policy instrument to ensure the effectiveness of LA21.

2.3.2. Outline of LA-EMAS

Based on voluntary participation of local governments, LA-EMAS is designed to promote

[29] LA-EMAS = Eco-Management and Audit Scheme (EMAS) for Local Government

[30] Council Regulation (EEC) No.1836/93 of 29 June 1993, Article 14 stipulates that Member States do not preclude analogical application, on a pilot basis, of provisions regarding EMAS to outside the industrial sector, including … the public service sector, for example.

[31] DoE Circular 2/95, The Voluntary Eco-Management and Audit Scheme (EMAS) for Local Government (1995), HMSO.

environmental management by participating local governments, thus ensuring continuous improvement of their environmental performance and expanding the provision of environmental information to the public. As mentioned above, the participation of local governments in LA-EMAS contributes to the preparation and implementation of LA21, and so the central government, the Improvement and Development Agency and the Local Government Association (LGA) have agreed to provide support.

A comparison between LA-EMAS and EMAS reveals three main differences[32]. First, EMAS evaluates individual business establishments and plants owned by companies, while under LA-EMAS, local governments might choose any bureau, department, division or other organizational unit as "operational unit" for participation, according to the "functions" or "types of operation" of public services. An operational unit may be an organic entity such as all local governments. Second, when a company registers a site under EMAS, the whole company must develop an environmental policy for obtaining certification, but EMAS-LA imposes a larger number of requirements as the registration of individual operations is possible. For example, the construction of a cross-departmental coordination system is required in addition to the development of an environmental policy for the whole local government. Furthermore, the participation of a department as operational unit entails declaring a fixed date by which all departments must have completed registration. The third difference concerns how to identify environmental impact. EMAS focuses on the identification of the environmental impact caused by corporate production activities, etc, such as the emissions of pollutants, the generation of waste, the amount of resources and energy used and noise. LA-EMAS adopts a more sophisticated approach in that measuring units for the government sector are determined separately for environmental burden from the activities of the local government itself and for environmental burden generated through the provision of local government services. Apparently, the latter refers to the impact on local residents resulting from the policies and measures implemented by the local government, which may be indirect impacts or social effects.

Since the scheme became fully operational in April 1995, just less than 10 LA-EMAS registrations have been made per year. 54 operations were registered as of January 2001. The London Borough of Sutton and Stratford-on-Avon District Council are the two local governments (autonomous districts) that made a head start on this scheme. A total of 11 local governments have been registered under this scheme, accounting for only about 2% of the total, but this does not mean that local governments in the UK are reluctant to participate in LA-EMAS[33].

[32] Mami, Oku, "Igirisu Jichitai Kankyo Kanri Kansa Scheme" in Tokyo Metropolitan Administration Research Group, *Toshi Mondai*, Vol.90 No.1, p.68, l 21.

[33] Oku, *op. cit.*, p.73, ll 4-6.

Figure 2-11. Comparison between LA-EMAS and (Original) EMAS

	EMAS	LA-EMAS
Audited unit	Individual sites owned by companies (concept based on geographic area).	Operational units: selected according to the functions and types of public services. (A bureau, department or division of a local government may constitute an operational unit.)
Measurement of environmental impact	Focused on environmental impact accompanying corporate production activities. Examples: pollutant emissions; waste generation; resource, energy & water use; noise, etc.	Direct impact → environmental impact accompanying daily operations of local governments. Service impact → environmental impact through services provided by local governments.
Registration requirements	Development of an environmental management policy for the whole company.	Development of an environmental management policy for the whole agency. Establishment of a cross-sectional coordination system at the level of the whole agency (note).

Note: Registration of any section of an agency must be preceded by the declaration of a registration schedule for all sections.

Source: Compiled by DBJ from Takemichi Hatakeyama, *Kankyo-ho Nyumon*, Nihon Keizai Shimbun.

2.3.3. LA-EMAS as environmental information system

In addition to its uniqueness in environmental performance management, LA-EMAS is characterized by active education and enlightenment on the Web. Indeed, a project called Pan European Local Authority Eco-Management and Audit Scheme is being conducted at the EU level. Participating countries include Sweden, Finland, Germany and Greece, as well as the UK. In order to disseminate the advanced practices in the UK to other EU countries, the program contains activities such as the development of a common guideline[34], the preparation of management training materials for local governments, the examination of pan European certificate, a scheme covering local governments only, research on how to utilize IT as an environmental information collecting tool, and the presentation of successful cases of local governments in utilizing information technology[35].

These case studies on LA-EMAS have been made public on the Web[36], where the results of the studies for five cities can be viewed. In the case of Sutton Council, disclosed information ranges from the Environmental Statement and environmental measures prior to the introduction of EMAS (waste, energy, water, traffic, resources, housing, environmental education, environmental management of Sutton Council, etc.) to environmental management promotion regime, activities related to the environment (including the construction of an environmental information system and the implementation of environmental monitoring) and expected results.

Information exchange including that via the Web has become increasingly active, as the environmental management system of the government differs from that of private companies.

[34] Because common standards, hastily developed, may not reflect the diversity (local characteristics) inherent to environmental information, the program assumes diversities including (1) difference between regions in priorities given to environmental problems, (2) various environmental management techniques, and (3) the consideration of differences in authorities and procedures in making environmental decisions.
Source: http://euronet.uwe.ac.uk/emas/brief.htm.

[35] These activities, supported by the EC (European Commission) LIFE Environment funding, are conducted in collaboration with groups such as the LGMB (Local Government Management Board), Eurocities and Ecotec.

[36] http://euronet.uwe.ac.uk/emas/library/suppot.htm. The study covers the five cases of North Wiltshire District Council, Taunton Deane Borough Council, Surrey Council, Sutton and Stratford-on-Avon District Council.

2.4. Environmental Information Laws in Germany

As regards environmental laws, Germany stands out among European countries in that it has developed an Environmental Statistics Law and a disclosure law specifically for environmental information. This subsection presents an outline of the two laws[37].

2.4.1. Environmental Statistics Law (Gesetz über Umweltstastistiken, BGB 1. I. S. 311)

Under the Environmental Statistics Law of 1980, which concerns the collection of environmental information in Germany, provisions for the collection of statistical information are designed for systematic collection of information on "environmental burden" and "environmental conservation measures" to be used in environmental planning. In this scheme, each province compiles data for statistical processing after required environmental monitoring. The results are then compiled and accumulated by the Federal Statistics Agency[38].

The Law provides for 1) public waste disposal; 2) waste disposal in the processing sector[39]; 3) public water supply and public wastewater disposal; 4) water supply and wastewater disposal in mining and processing; 5) water supply and wastewater disposal in power stations, etc. intended for public supply; 6) waste disposal and wastewater disposal in livestock production; 7) accidents in the storage of substances that may cause danger to the basin area; 8) accidents in transportation that may cause danger to the basin area; and 9) in the case of information related to environmental conservation investment in the processing sector, the timing of investigations and the person responsible for the provision of the information[40].

Figure 2-12. Scheme of German Environmental Statistics Law

Item	Outline
Objective	Systematic collection of information on environmental burden and environmental conservation measures to be used in environmental planning.
Method	Individual provinces to conduct statistical surveys, the results of which are compiled by the Federal Statistics Agency.
Coverage of information to be collected	1) Public waste disposal, 2) waste disposal in the processing sector, etc., 3) public wastewater disposal, etc., 4) wastewater disposal, etc. in mining and processing, 5) information related to environmental conservation in processing, etc.
Regulation and persons concerned	Timing of statistical information survey and persons responsible for providing information.

Source: DBJ.

2.4.2. Environmental Information Disclosure Law (Umweltinformationsgesetz: UIG)

The Environmental Information Disclosure Law was enacted in 1994 according to the EU Directive on Environmental Information Disclosure (90/212/EC). Although information disclosure schemes had already existed under federal laws before the enactment of the Law, most of them were concerned with administrative procedures and thus Germany did not recognize disclosure in a comprehensive manner[41].

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37 This section makes reference to Yumihiko Matsumura, *Kankyo-ho*, Seibundo (1999), pp.100-108.

38 Statistics on water management are subject to laws and orders under the Federal Statistics Law (BGB 1. I. S. 1437, 1967).

39 The concept of the processing sector is broader than that of the manufacturing sector, for it includes commercial energy management, water supply, mining and construction among others. Likewise, 9) covers those industries.

40 In the manufacturing sector, for example, this provision is applicable to business establishments of manufacturers and covers information on the type, amount and disposal of waste. The responsible person may be the manager or head of the company to which the establishment belongs, the head of the establishment, or a third person who employs the manager or head of the company or establishment. Matsumura, *op. cit.*, p.100, ll 16-19.

41 Matsumura, *op. cit.*, p.103 ll 3-4.

The information covered by the Law is limited in terms of 1) owners of the information and 2) types of environmental information. Information owners are defined as those in charge of duties related to environmental conservation in the federal government, provincial governments, municipal governments and other public entities involved in certain types of administrative activities. The disclosure of any information submitted by a third party does not require the consent of that third party, except that the disclosure of any information provided voluntarily requires prior consent of the provider. Information owners also include those natural persons and legal persons in private law who perform public duties in the field of environmental conservation under the supervision of government ministries or agencies[42]. Environmental information to be disclosed includes a) the conditions of water area, air, soil, etc.; b) acts or measures that cause nuisance to daily life, etc.; and c) acts or measures for environmental conservation.

The Federal Administrative Court has ruled that the method of disclosure is within the discretion of the government. However, the method required by the person making the request for information should be respected in the absence of any justifiable reason including the abuse of the right to request disclosure.

The application of the law may be waived on the ground of the protection of public interest (the protection of international relations, smooth judicial or criminal investigation proceedings, etc.) or the protection of private interest (operational or business secrets).

3. Conclusion

In the US, information technology has been introduced through the "e-government" initiative, a concrete measure for reinventing government. Based on the five principles for environmental regulation reform, the Environmental Protection Agency has also been engaged in the reconstruction of environmental administration with information technology. The improvement of environmental information is a priority in the initiative. A framework for active participation of local residents and businesses has been developed mainly through the establishment of a system to ensure consistent evaluation of environmental levels in various parts of the country in terms of air and soil pollution, among others.

The improvement of environmental information and the utilization of information technology have also made headway at the level of local communities. Coordination between industry, academia and the government can be observed in measures such as the development of environmental legislation, electronic processing of applications for permission and approval, original methods of environmental monitoring, as well as the enhancement of, and improved access to, information related to the Superfund Act.

In Nordic countries (Finland and Sweden), the framework of an e-government based on information technology has been developed to improve not only efficiency but also convenience in view of the harsh climate. A similar movement can be observed in environmental administration. At the local level, relevant authorities, in cooperation with the central government, are developing a uniform monitoring system. Other examples of collaboration among the industrial, academic and public sectors include the development of environmental information

[42] Legal persons in private law do not automatically become subject to direct requests for information due to the fact that they have established waste emitting facilities. As mentioned above, however, any information submitted to the government according to a legal obligation becomes part of the information owned by the government. According to some doctrines, persons who assume the responsibilities of managers in environmental pollutant and waste disposal facilities, etc. according to legal requirements are obliged to disclose their information, as well as environmental certifier and certifying organizations. But the majority considers otherwise.

technology, lifecycle assessment and the construction of soil pollution databases. Such moves are supported by the principle of disclosure of environmental information. Elsewhere, some local governments in the UK have adopted the corporate environmental management system (EMAS), and the expertise thus accumulated is now being disseminated in other EU countries including through information technology. In some cases, local governments are taking the initiative to manage environmental performance in collaboration with local communities (residents and businesses).

Figure 2-13. Environmental Information Policy in Selected Countries

Country	Scope of environmental information	Characteristics of policy implementation
US EPA initiatives in major states	Environmental information in general (in particular, information related to toxicity, environmental burden and policy measures/technology)	・ Maintain coordination between the construction of federal e-government and environmental information policy measures. ・ Ensure the consistency and compatibility of information on federal EPA. ・ Clarify the roles of the public and private sectors, and the federal and local governments. Original environmental policies at the local level. ・ Provide support through a system of collaboration among industry, academia and government.
Sweden Finland	Information related to toxicity Information related to environmental burden Information related to policy measures and technology	・ Realize tie-ups and burden sharing in environmental information between the central and local governments. ・ Develop environmental information systems led by national research institutions (policy measures focused on software → shift of focus to the flow of environmental social capital cost) ・ Develop and operate schemes and databases to accommodate corporate behavior such as lifecycle assessment (LCA).
UK LA-EMAS	Environmental management information	・ Construct environmental management systems considering the environmental performance of local governments themselves. ・ Disseminate management methods through inter-regional exchange using IT. Principle of disclosure of environmental information.
Germany	Information related to environmental schemes and policies Information related to toxicity Information related to environmental burden	・ Develop the Environmental Statistics Law as a precondition for the construction of environmental databases. ・ Enact the Environmental Information Disclosure Law to facilitate the flow of environmental information.

Source: DBJ.

Germany has enacted an Environmental Statistics Law at the national level to enhance environmental information. Along with the disclosure scheme under the Environmental Information Disclosure Law, the legislation is designed to facilitate the distribution of environmental information. Such institutional infrastructure, though not necessarily linked with information technology, should play an important role in its eventual utilization.

What is the current status of environmental information policy in Japan? How is information technology used in actual administrative activities? The following chapter describes institutional development of environmental information policy and the actual utilization of information technology, and outlines the efforts underway toward building e-government.

III. Development of Environmental Information Policy in Japan

1. Development of E-government and Computerization in Local Communities

1.1. Development of E-government at the National Level

At the national level, efforts have been intensifying to construct e-government to provide better administrative services through substantial improvement of convenience to the population and businesses, increased transparency of administrative services, integrated administrative operation, improvement in functionality, simplification and higher efficiency.

Compared with other countries, Japan lagged behind major developed countries such as the US and Canada by about two years in the development of e-government[43]. In December 1999 the government announced its commitment to develop e-government in the framework of the Millennium Project. The "e-Japan" program, prepared and announced in March 2001, envisages that about 10,800 applications – 98% of the procedures in the central government – will be processed electronically by fiscal 2003[44]. Legislative procedures have been progressing well, as the government expects to submit to a regular Diet session in 2002 a bill allowing all procedures to be made in electronic form. As infrastructure for building e-government, the "Kasumigaseki WAN" – a LAN (local area network) of special lines linking the ministries and agencies of the central government – has almost been completed.

In its relations with local governments, the central government has drawn up an E-government and E-local Government Promotion Program to prepare for online processing of most procedures in local governments, as all procedures in the national government will be processed online by fiscal 2003. Ongoing infrastructure development includes the Integrated Administration Network, which links about 3,200 local governments nationwide.

The construction of e-government will also address existing issues such as business process reengineering (BPR) and simplification. There has also been coordination between the public and private sectors in solving important issues such as procurement procedures, tax declarations and payments, online voting, the development of population register network systems, the development of infrastructure for various certifications and information security[45].

The construction of e-government may stimulate the development of IT industries. Some fear, however, that major vendors might enclose users by low-price bidding without considering profitability or by adopting particular specifications[46].

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[43] Nikkei Sangyo Shimbun, October 31, 2001, p.5.

[44] Nikkei Sangyo Shimbun, December 4, 2001, p.5.

[45] Although this report does not describe the construction of e-government in detail, the example of the UK is worth mentioning. In the UK, the current Blair administration announced in 1998 that the government services will be fully available online by around 2005. Its main objective is to improve access to the government by establishing a one-stop counter for the whole range of administrative procedures. Thus, UK Online was constructed as a Web-based front-end in 2000. Using electronic certification technology, a Government Gateway was established in March 2001 for reports and applications.

[46] Nikkei Sangyo Shimbun, November 28, 2001, p.3.

Figure 3-1. Development of E-government

Policy phase	Individual measure	FY 2000	FY 2001	FY 2002	FY 2003
Computerization of public-private contact	Online applications and reporting	Planning →		Implementation	
	Government certification systems	Definition of specifications →		Development and operation of certification systems	
	Online procurement	Information databases →		Preparation and experiment of electronic bidding	
	One-stop services	Development of portal sites →		One-stop services for customs procedures, etc.	
Computerization of internal administration	Inter-ministerial electronic document exchange systems	Utilization of Kasumigaseki WAN in all ministries and agencies →			
	Integrated document management systems	System development →		Operation in all ministries and agencies	
Cooperation with local governments	Development of Local Government Wide Area Network (LGWAN)	Experimental connection with Kasumigaseki WAN →		Development in individual local governments	

Source: DBJ

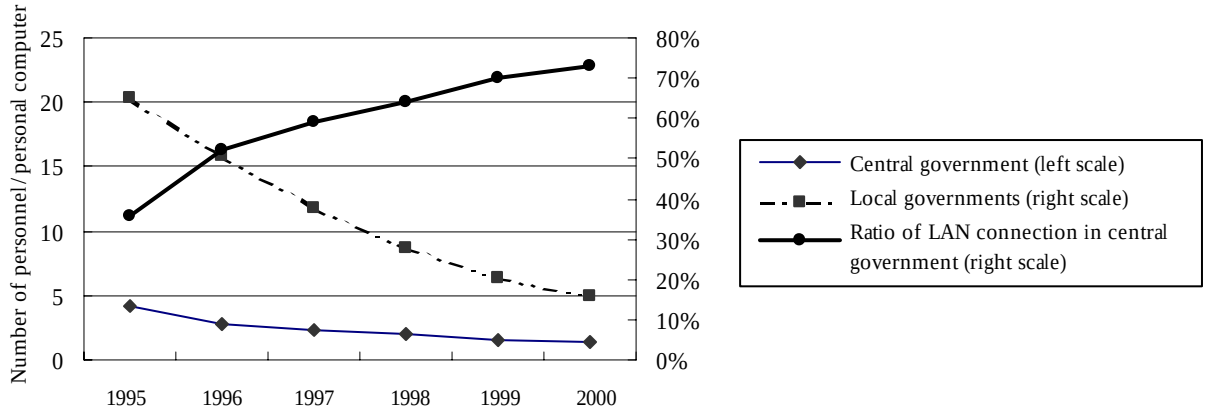
1.2. Computerization in Local Communities and E-government

As the above-mentioned measures are increasingly put into practice at the national level, how far has e-government progressed at the local level? This subsection outlines trends in computerization, etc. in local governments.

The number of personal computers is often used as a principal indicator of computerization, and in this sense, computerization has progressed in the central government with almost one personal computer per employee. By comparison, the introduction of personal computers in local governments still lags far behind.

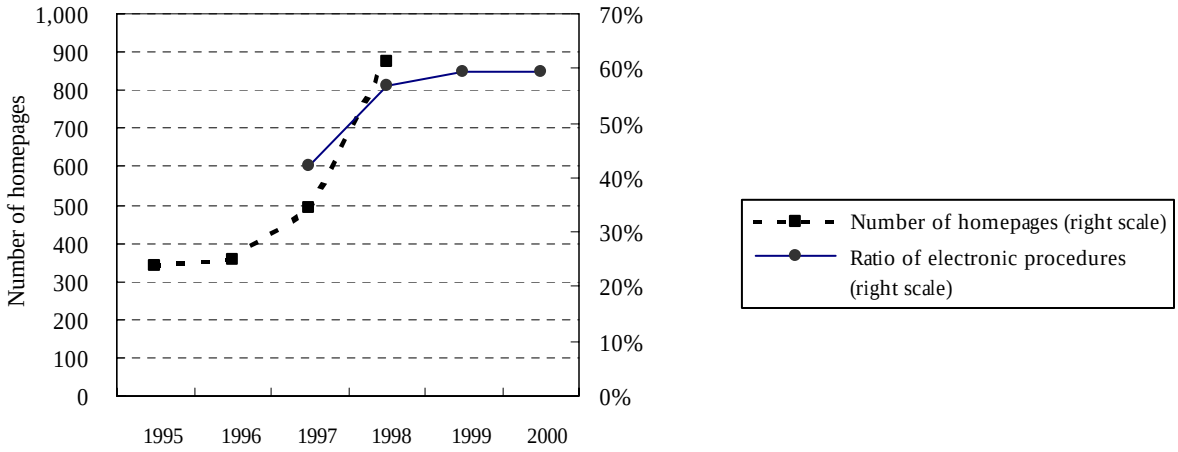
Although an increasing number of local governments have their own homepages, the introduction of electronic procedures on the Internet has stalled in about 60% of the local governments, and rapid progress in fiscal 2001 is unlikely.

Figure 3-2. Introduction of Personal Computers in Government



Source: Compiled by DBJ from "FY 2000 Report on the Result of Basic Survey on Government Computerization" (former Management and Coordination Agency).

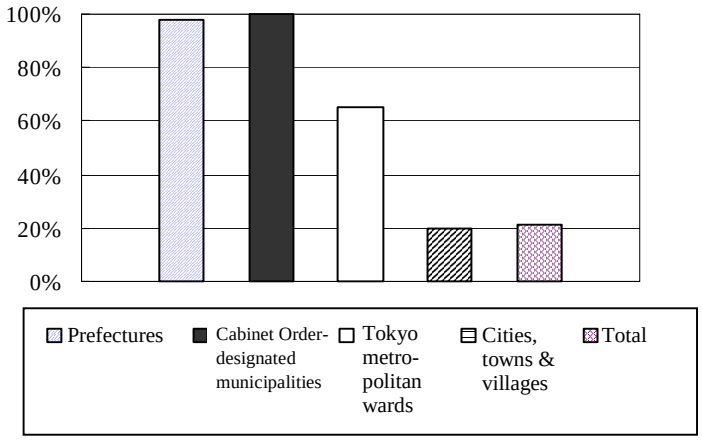
Figure 3-3. Trends in Ratio of Electronic Procedures and Number of Homepages



Note: "Ratio of electronic procedures" refers to the share of actual electronic procedures in total number of procedures that can be made in electronic form.

Source: Compiled by DBJ from "Progress in Government Computerization" (Management and Coordination Agency).

Figure 3-4. Share of Local Governments Having Prepared Computerization Plans



Source: Compiled by DBJ from "Outline of Computerization Measures in Local Governments" (as of April 1, 1999).

Moreover, many cities, towns and villages, other than the municipalities designated by Cabinet Orders, have yet to prepare local computerization plans.

Thus, the development of e-government at the local level (electronic applications, the development of infrastructure including electronic certification, institutional development for electronic procurement, etc.) will need to be addressed in the years ahead.

The reasons for the delay in building e-government in local governments include inadequate organizational structure, lack of computer literacy among staff and insufficient awareness among directors including government leaders, as well as the difficulty in securing necessary budget. If local governments are to proceed with the construction of e-government in the face of financial difficulties that are even more serious than for the central government, they need to change their administrative processes themselves, and to develop electronic administration systems in a coordinated manner.

How have environmental information policy measures been implemented in relation to the construction of e-government? Smooth introduction of information technology in the government sector, coupled with information sharing between the public and private sectors, is important for environmental information policy. As compared with various information in ordinary policy measures, environmental information has such characteristics as mentioned in Chapter I – (1) secrecy, (2) diversity and (3) complexity/specialty). It should be noted that how to address the negative aspects of environmental information is crucial in introducing information technology.

The following section examines the legal aspects of environmental information and trends related to information technology as a tool of information dissemination. First, national policy measures will be outlined, followed by a discussion of specific examples of IT utilization at the local level.

2. Environmental Information Policy Measures

2.1. National Policy Measures

2.1.1. Legal schemes concerning environmental information

Since there is no separate legal scheme for the regular collection and management of

environmental information, various environmental statistics have been developed under individual environmental regulations. The disclosure of information has been addressed within the framework of the Information Disclosure Law (the Law concerning the Disclosure of Information Owned by Administrative Organs: Law No.42 of 1999).

As regards environmental information statistics, for example, the Chemical Substances Law regulates information related to toxicity. The law requires permission and reporting in producing and importing chemical substances (Articles 6 and 26), as well as record-keeping on production, inventories and sales volume (Article 19). It even provides for an information disclosure scheme (Article 23). Information on facilities and technologies must be recorded when such facilities have been constructed (Article 6 of the Air Pollution Control Law, etc.). After the start of operation, information related to environmental burden (Article 16, for example) must be measured and recorded. The coverage of information related to environmental burden is substantial, and the government has the obligation of recording and measuring some of the items (Articles 20, 22 and 24 for example).

Some questions have been raised, however[47]. Most of such legal schemes are designed to regulate and monitor facilities and substances, rather than regularly collecting, managing and disclosing systematic information. Therefore, they may not be suitable for environmental management in the medium to long term.

Figure 3-5. Legislation related to Environmental Information Statistics under the Current Environmental Law System (by Type of Information)

Scope of environmental information	Existing laws for regulation and supervision	Outline of scheme
Information related to toxicity	Chemical Substances Law	Permission & reporting scheme for the manufacture, etc. of specified chemical substances (Articles 6 and 26), obligation to record volumes (Article 19-I, Rule 7-I), information disclosure scheme for competent authorities (Article 23-I).
Information related to facilities and technologies	Air Pollution Control Law, Water Pollution Control Law, Noise Control Law, etc.	Notification of facility installation (smoke and soot: Air Pollution Control Law Article 6-I, dust: Article 18-I, etc.), authority for requesting reports, entering and inspecting (Air Pollution Control Law Article 26-I), etc.
Information related to environmental burden	Ditto at the time of installation	Obligation to measure and record the volume of smoke and soot, etc. (Air Pollution Control Law Article 16), obligation to measure and record the amount of specified dust (Article 18-12), etc.
	Air Pollution Control Law, Water Pollution Control Law, Noise Control Law, Vibration Regulation Law	Obligation of measurement, monitoring and disclosure for the government on certain items (Air Pollution Control Law Articles 20, 22 and 24), obligation of constant monitoring and disclosure on groundwater (Water Pollution Control Law Articles 15 and 17), etc.
	Air Pollution Control Law, Water Pollution Control Law	Claims related to accidents (Air Pollution Law Article 17, Water Pollution Law Article 14-2), etc.

Source: Compiled by DBJ.

The PRTR Law was enacted recently to require businesses to record the inventories and movements of chemical substances. This report does not discuss the PRTR scheme in detail, as it has been dealt with in various books and articles. However, the scheme may provide incentives

[47] For example, Matsumura, *op. cit.*, p.101 ll.7-10.

to the construction of environmental information databases on chemical substances. Although some questions have been raised[48], the scheme is considered suitable for promoting the introduction of information technology[49].

2.1.2 Environmental information systems

As regards environmental information systems, environmental information is increasingly being provided and exchanged on the Web based on the Environment Basic Law. The National Institute for Environmental Studies, an administrative agency, has established and now operates on its homepage EI-guide 8.1[50], a portal site for environmental information, as well as Environmental Quantity Database[51], a monitoring site providing information related to environmental burden including air pollution. In 1997, the Environmental Information Center established an Environmental Information and Communication Network (EIC)[52] to provide and exchange various kinds of environmental information in electronic form.

Technological development using information technology has also been pursued with the establishment of policy programs such as the Next-generation Environmental Risk Monitoring System.

Figure 3-6. Examples of National Policies

(1) National Institute for Environmental Studies
EIC (=Environmental Information & Communication Network)

・Objective	To facilitate the provision and exchange of environmental information to promote environmental education and learning as well as private environmental conservation activities.
・Legal basis	Environment Basic Law Article 27.
・Date of installation	Full utilization of the Internet started in January 1997.
・Information provided	Collection and provision of information on environmental administration (Environment Agency press releases, administrative documents, environmental laws and regulations, etc.) and environmental information (information on environmental information sources, information on the promotion of environmental conservation activities, etc.).

(2) Ministry of the Environment
Next-generation Environmental Risk Monitoring System

・Outline	Monitoring system that constantly measures hazardous substances contained in air, water, soil, etc. and notifies any anomalies.
・Budget	¥20-30 billion over the next 10 years.
・System	Collects measurement data online from sensors distributed nationwide. Displays the data using the Geographic Information System (GIS) and gives warning as necessary. Shares environmental measurement information with local government and businesses through networking.
・Development	Cooperation with National Institute for Environmental Studies, universities and measuring instrument/communication equipment manufacturers.

Source: Compiled by DBJ from Ministry of the Environment homepage, etc.

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[48] For example, some argue for the interpretation that (1) data owned by individual business establishments should be disclosed on request, or that (2) as regards trade secrets, the minister in charge should be obliged to disclose the complete file of the relevant records.
Source: Hiroshi Yamada, "Kagaku Busshitsu to Kankyo Joho Kokai," in Environmental Law and Policy Society, ed., *Kankyo-ho Seisaku Gakkai-shi*, No.4, p.21-22.

[49] Yamada, *op. cit.*, p.23 l.29- states that hard data such as emissions from individual business establishments only require the application of the Information Disclosure Law, and therefore do not constitute the *raison d'être* of the PRTR law in themselves (for details, see Shizuo Fujiwara, "Kankyo Joho no Kokai to Risk Communication," in *Zokan Jurist Shin Seiki no Tenbo 2*, Yuhikaku, p.72 l.10-). Rather, the PRTR Law is designed to develop and provide "higher quality" environmental information by contributing to risk communication with residents and environmental management by the government.

[50] A type of metadata and contains an index for each environmental field as well as the "table of contents" for each category of information such as facilities/technologies and environmental schemes/policies, etc.
Source: http://www.nies.go.jp/db/eic-j/ei_guide8/x/514/htm.

[51] Monthly and annual data concerning national atmospheric environment and annual data concerning public water bodies are available on this site. The measurement data only covers the FY 1990-1999 period at present.
Source: http://www.nies.go.jp/igreen/index.html.

[52] EIC focuses on domestic and international news related to environmental administration, environmental education and event information, among others (http://www.eic.or.jp).

Such policy measures are not free from problems, either. Although the central government, under Article 27 of the Environment Basic Law[53], is to provide information through EIC, the provision also states that the government may "use its discretion to a considerable extent" in providing the information[54]. This contrasts greatly with the case of Germany, where a systematic legal code concerning the collection of environmental information, which includes the Environmental Statistics Law, stipulates legal obligations in providing environmental information. Although individual laws such as the Water Pollution Control Law and the Nature Conservation Law require reporting in the case of accidents involving the emissions of hazardous substances, those provisions may not be satisfactory in that competent authorities including local governments are not required to disclose environmental information that they own. Further discussion is needed on issues including the persons authorized to collect environmental information, the scope of the information to be collected, the method of data management including databases for environmental information thus collected, issues related to data collection including the persons responsible for reporting and the scope of the data to be reported, as well as the best practice in disclosing environmental information.

2.2. Local Policy Measures

2.2.1. Institutional development

As noted above, the utilization of information technology and the construction of e-government have only just begun at the level of local governments. As regards the disclosure of environmental information, a handful of local governments are now amending ordinances to ensure harmonization with the Information Disclosure Law.

Against this backdrop, some local governments are also considering the enhancement of environmental information. The Tokyo metropolitan government amended the existing Information Disclosure Ordinance in time for the enactment of the Information Disclosure Law. As a unique movement, it is also striving to improve information disclosure to parallel the US standard. In 1998, the Tokyo government prepared a "Platform for the Promotion of Information Disclosure," which envisages "active" disclosure of certain archives on the Internet with or without any request[55]. Further, the Information Disclosure Ordinance went into effect in April 2000, in time for the enactment of the Information Disclosure Law by the central government. Since environmental information is included in the administrative information to be disclosed, the Ordinance provides an important institutional design for environmental information policy.

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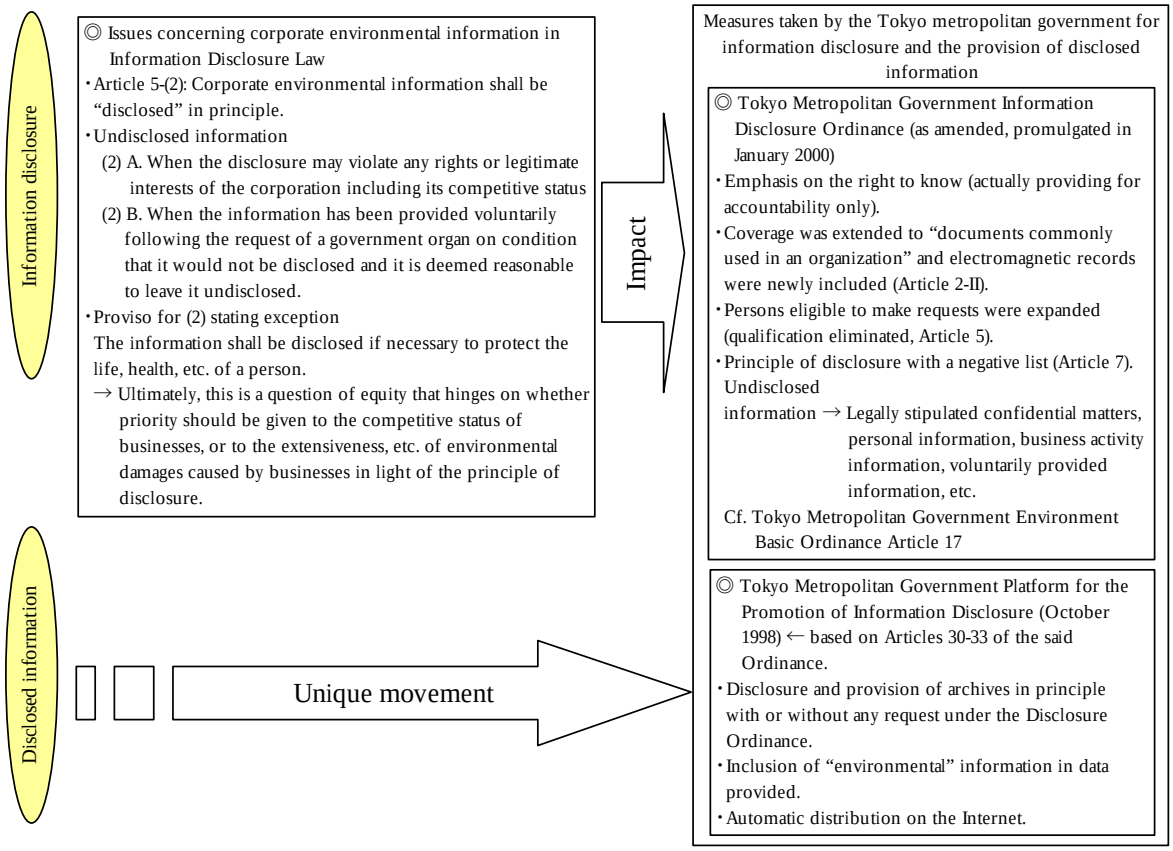
[53] Article 27 of the Environment Basic Law: "The government … shall seek to provide appropriate information on environmental conditions and other necessary information for environmental conservation, subject to the protection of the rights or interests of individuals and corporations."

[54] Setsuo Konoyama, "Seifu Saisei to Denshi Seifu ni okeru Kankyo Joho no Denshi-teki na Teikyo to Hokoku," in *Joho Gyosei Mondai Kenkyu*, Kansai University Economic and Political Research Institute (2000), p.71, l.3.

[55] Tokyo Metropolitan Government Information Disclosure Ordinance Article 30 Paragraph 1: "The Tokyo metropolitan government … shall enhance information disclosure and provision measures and seek to promote information disclosure in an integrated manner, to ensure prompt and easy access for the residents to precise and easy-to-understand information on the policies of the government."

Figure 3-7. Relation between Information Disclosure Law Issues concerning Environmental Information and Measures Taken by Tokyo Metropolitan Government



Source: DBJ

Are there any projects to ensure smooth flow of environmental information by utilizing information technology? In light of the emergence of waste management policy in Japan and the adoption of environmental accounting in businesses, which is now impacting on the policies of local governments with the identification of environmental costs and benefits, the following section provides some case studies on environmental management information.

2.2.2. Utilization of IT in environmental administration

Waste management (information related to environmental burden, etc.)

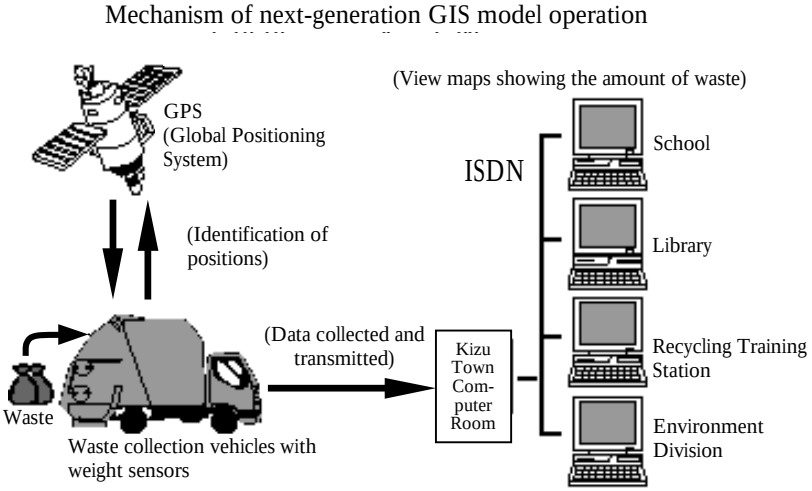
Efficient processing systems have also been introduced in waste management. This section outlines the Waste Reduction Strategy Information GIS System (Kizu Town, Kyoto Prefecture)[56], which utilizes the GPS (Global Positioning System), followed by some examples of other local governments.

GIS stands for Geographic Information System. The Kizu system combines GIS and GPS. Waste collection vehicles, equipped with digital cameras and weight sensors, investigate waste generation and discharge in each area. At the same time, the positions of the vehicles are identified precisely using a communication satellite. The environmental information thus collected (information related to environmental burden) is processed by computer to analyze the

[56] See http://www1.mahoroba.ne.jp/~kizu-res/project2.html.

amount and type of waste by area, by person, by age group and by family composition. It is also possible to conduct a simulation analysis on the pattern of waste discharge.

Figure 3-8. Waste Reduction Strategy Information GIS System



Source: Kizu Town homepage.

The Kizu Town government notes the following three merits of introducing the system. First, it allows the development of a highly effective waste reduction plan that considers local characteristics. The collection of specific waste generation data by area, as mentioned above, enables a precise response by quantifying the effect of waste reduction policy. Second, the system is expected to stimulate waste reduction activities and effectively reduce the disposal cost. The disclosure of waste data on the Web, etc. is expected to raise public awareness of the environment and facilitate the shift to an environment-friendly lifestyle. Third, the system can be used in urban development planning. By analyzing the relationship between local characteristics and waste generation, it is possible to estimate future waste generation, and thus to forecast the burden on waste disposal facilities (i.e. the application of information related to environmental burden to facility and technical information), as well as the assessment of impact from the construction of condominiums and urban facilities.

In any case, the utilization of information technology itself does not directly lead to reduction in waste discharge. Rather, daily efforts by the local government should be accompanied by smooth dissemination of environmental information to the residents[57] and the cooperation of the residents in environmental conservation, if the introduction of information technology is to successfully contribute to environmental information policy.

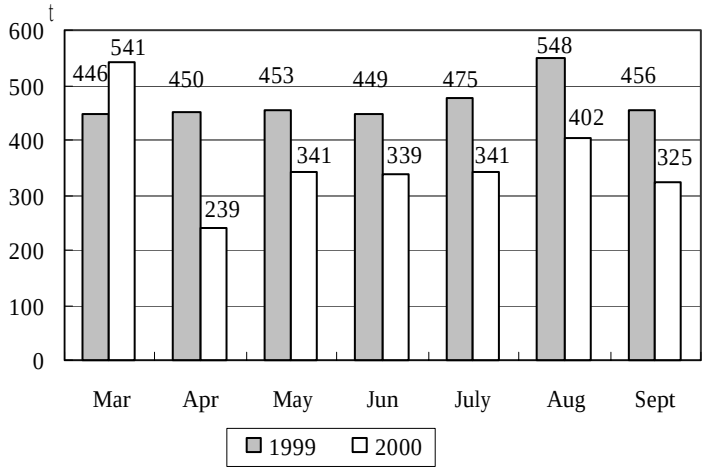
The city of Koshoku in Nagano Prefecture introduced in April 2000 a Waste Management System to collect waste discharge data by putting bar-code stickers on household waste bags. The city government distributes to all households bar-coded stickers, on which the names of householders are recorded and the names of neighborhood self-governing bodies to which they belong. The residents put these stickers on waste bags before discharging them. Waste collectors use bar code readers to accumulate the data, and transmit them to the city's database for aggregation at the end of their daily work.

[57] Kizu Town provides schools with well-managed environmental information on the Internet. The information is also available at libraries, etc.

According to the analysis of the city government, with the cooperation and understanding of the residents, the system has substantially reduced waste generation[58]. The city also analyzes the collected environmental information to identify the pattern of waste discharge by household composition and by area, and the results will be used as basic data in charging fees for waste collection.

Elsewhere, the city of Ichihara in Chiba Prefecture introduced a remote surveillance camera system in August 2000 to control illegal dumping, as incidents of illegal dumping in coppice woods of industrial waste including construction materials and also domestic waste were increasing rapidly. The surveillance cameras, now installed in several places in mountainous areas and coppice woods in the city, are turned on when a vehicle passes nearby, and the image is transmitted by portable phone circuits to the city's Environment Division for display and recording. If identified, the illegal dumper will be asked to remove the waste. Even in this case, however, the utilization of IT in environmental information policy itself is not considered to be a key factor. The city government recognizes that the system will be effective only when it is accompanied by institutional support, cooperation and collaboration with citizens and civic organizations[59].

Figure 3-9. Trend of Waste Discharge in Koshoku City



Source: "Gekkan Kankyo Jichitai," Nihon Kogyo Shimbun (June 2001), p.21.

These examples indicate that the efficient collection of environmental information "online," utilizing information technology, facilitates the flow of environmental information. However, "offline" systems are also an important infrastructure to be developed, including institutional support and the cooperation of local residents, when introducing systems using various information technology.

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[58] The city government considers that the cooperation of residents has contributed to the smooth introduction of information technology and to waste reduction mainly because the city had already (1) required residents' names to be marked on waste bags, (2) implemented the collection of meticulously classified waste, and (3) designated special bags for waste discharge. Source: *Ibid,* p.23.

[59] The cameras cannot be installed in all mountainous areas, etc. Illegal dumping has been declining due to cooperation with the residents, coupled with various policy measures such as the system of surveillance patrols against illegal dumping by citizens (1989) and the development of a draft ordinance effectively banning the entrance of large-sized vehicles into municipal forest paths (September 2000).

Local government version of environmental accounting (environmental management information)

The city of Yokosuka[60] introduced for the first time in Japan a "local government version" of environmental accounting on an experimental basis toward e-government. The data are now available on the Web in electronic form for fiscal 1998 and 1999.

In introducing environmental accounting, the city classified its environmental policy measures into direct measures and indirect measures, and the cost-effectiveness of environmental policies has been measured according to this classification. In private companies, environmental accounting primarily measures and evaluates the cost and effectiveness of direct measures. In the case of local governments, however, it is also considered important to measure and evaluate the cost and effectiveness of indirect measures.

Figure 3-10. Direct Measures and Indirect Measures

	Definition	Typical examples
Direct measures	Policy measures implemented to reduce the burden placed on the environment by the government's activities	○ Pollution control activities (air conservation at sewage treatment centers) ○ Global environment conservation activities (waste heat utilization for water) ○ Resource recycling activities (paper recycling) ○ Environmental management activities (building environmental management systems, etc.)
Indirect measures	Policy measures and services implemented by the government to reduce the burden placed on the environment by residents and businesses	○ Air pollution control services (monitoring, regulation and guidance of factories, etc.) ○ Water pollution control services (water quality survey, development of public sewerage) ○ Waste management services (general waste management service, waste reduction promotion service) ○ Natural environment conservation services (park construction service, river improvement service)

Source: Yokosuka City (http://www.city.yokosuka.kanagawa.jp/k-kaikei/03.html).

The city also classifies the effect of the two types of policy measures into private effect and social effect. In private companies, only private effect is measured as the effect of environmental activities. In local governments, however, social effect is also measured and evaluated, as total effect of indirect measures cannot be represented solely by private effect. By disclosing these data even at the experimental stage, the city allows their evaluation through public comments. Based on this evaluation, the city intends to improve the quality of environmental accounting on its own initiative. Such efforts to improve environmental information in an interactive way deserve particular attention[61] [62].

[60] Yokosuka City has taken innovative steps toward e-government, introducing for the first time in Japan a unique "electronic bidding system" in line with the original bidding system of the city. The city's experiments have been the subject of many books and articles, including Nihon Kogyo Shimbun, November 29, 2001, p.4.

[61] In concrete terms, private effect and social effect in environmental accounting are as follows.
Source: Yokosuka City website.

Effect	Definition	Example
Private effect	Those costs generated through actual market transactions that were averted or reduced as a result of direct measures.	○ Electricity charges reduced by power generation using waste heat. ○ Fuel cost, etc. reduced by lower fuel consumption.
Social effect	Those damages to health, life, properties, etc. by environmental pollution that were averted or reduced as a result of direct or indirect measures.	○ Damages to health averted or reduced by air pollution control measures. ○ Deterioration of amenity averted or reduced by water pollution control measures.

[62] For aggregate results for fiscal 1999, see http://www.city.yokosuka.kanagawa.jp/k-kaikei/05_11_1.html (direct measures) and http://www.city.yokosuka.kanagawa.jp/k-kaikei/05_11_2.html (indirect measures).

Some questions may be raised, however. For instance, the definition of the part belonging to indirect measures is rather simplistic, subtracting the part of direct measures from the entire services listed on the environment basic plan. Of course, the improving the quality of environmental management information first requires the city government to voluntarily make appropriate responses to public comments. In addition, intellectual support at the national level is expected in the future, along with the enhancement of local environmental management information in cooperation with other local governments.

3. Conclusion

This chapter outlined the trend of building e-government in Japan and examined institutional development and the use of IT in the field of environmental information policy with some case studies. The introduction of economically reasonable tools such as electronic application and procurement is a necessary condition for improving government efficiency. However, techniques such as the computerization of government procedures in general are not sufficient for full utilization of environmental information, which is characterized by its secrecy, diversity, complexity and specialty. Institutional design according to the characteristics of environmental information is important, and should be based on partnerships with residents and businesses.

How is environmental information policy expected to develop in the future? The final chapter summarizes some of the remaining problems and expected issues.

IV. Issues to be Addressed in Future Environmental Information Policy

Any future shift in environmental administration paradigm through public-private collaboration will require qualitative and quantitative enhancement of environmental information and the elimination of the existing divide in environmental information. The introduction of information technology in environmental information policy will be a strong support in this regard, but will hardly be a sufficient condition. As discussed earlier, judgment should be made on whether the introduction of IT is appropriate, the cases where the utilization of IT is difficult should be identified, and the costs and benefits of data dissemination with IT should be examined, all based on the characteristics of environmental information.

Figure 4-1. Environmental Information Matrix

Type of environmental information			Examples	Main purpose of dissemination	Closely related sectors	Characteristics of information	Easiness of collection	Ways and means of collection/ disclosure	Disclosure-friendliness	IT-friendliness
Environmental information (broad sense)	Environmental information (narrow sense)	Information related to the environment itself	Animal and plant ecology	Improvement of environmental awareness	Government	Diversity, complexity & specialty	○	Monitoring	○	○
		Information related to toxicity	Chemical substances	Effective application of the right to know	Residents, businesses	Secrecy, complexity & specialty, diversity	×	Regulation, monitoring	×	○
		Information related to environmental burden	Measured values of environmental concentration	Effective application of the right to know	Residents, businesses	Secrecy, complexity & specialty, diversity	×～△	Regulation, monitoring, incentive (Eco labeling)	×～△	○
	Facility and technical information		Trend of private recycling facilities	Improved efficiency of environmental conservation measures	Government, businesses	Secrecy, complexity & specialty	×～△	Regulation, incentive	△	△
	Information related to environmental schemes and policies		Information on environmental laws and education	Efficient environmental administration, smooth corporate activities	Government, businesses	Complexity & specialty, diversity	○ (△ for bylaws)	Information disclosure, (disclosed information), environmental education	○	◎
	Environmental management information		Environmental accounting, ISO14001	Improvement of environmental performance	Government, businesses	Diversity	△～○	Enlightenment, incentive	△	○

Source: DBJ.

What issues need to be addressed? What viewpoints are valid in tackling these issues? Three axes may be considered: (1) structural issues facing the government (local governments in particular), (2) institutional issues in environmental information policy, as discussed in the previous chapter, and structure for the development and operation of environmental information, and (3) issues related to the quality of environmental information (contents). These issues are discussed in the following sections.

1. Structural Issues

Structural issues refer to issues concerning (environmental) administration in general, including environmental information policy. These issues may be addressed from both software and hardware aspects. In terms of hardware, e-government is still far from complete, as described in Chapter III, and the development of infrastructure has been particularly slow at the local level. For networking as well as information terminals, inter-regional connection of trunk networks will be important in preparing for the eventual connection with central networks. The establishment and smooth introduction of core technologies for building e-government, such as electronic application and certification, are essential in addressing the hardware issues.

Despite such hardware issues, the development of software is much more important. The introduction of software for protecting personal and corporate information is particularly important, as this directly encourages the use of information technology. Software is also involved in the organizational structure required for introducing information technology. It has been pointed out that the vertical division of administrative structure is a serious obstacle to the introduction of information technology. It is rare in Japan that a local government has a CIO (Chief Information Officer) such as is common in local governments in Europe and North America. The heads of local governments must work in unity with information lines.

As was mentioned in Chapter I, local governments are facing even more serious financial difficulties than the central government, for their sources of financing are limited. Investment in environmental administration will have to continue under these circumstances, and so budget allocations must be monitored to ensure the purchase of hardware does not take precedence over software development.

2. Institutional Issues

Information technology alone cannot ensure the enhancement of environmental information policy. Institutional development and enhancement according to the characteristics of environmental information is also expected. The judgment on whether a specific scheme is needed for the disclosure of environmental information, as in the case of Germany, depends on the implementation and interpretation of the Information Disclosure Law, which is a general legislation. The answer to this question will emerge as interpretive arguments develop. Meanwhile, the US-style active disclosure of environmental information on a voluntary basis, observed in some local government, is expected to become an important movement.

In particular, the development of environmental statistics is important not only for policy-making, but also for smooth collaboration between the public and private sectors through disclosure to residents and businesses. Schemes related to environmental statistics are defined by separate laws and are rather unsystematic. If environment management techniques are to evolve with the measurement of local or national environmental performance, the consolidation of environmental statistics should be regarded as a priority.

In addition to institutional design, appropriate structures need to be built to promote environmental information policy. Although this report describes only a few of the local projects in Japan, the barrier of administrative boundaries has hampered the development of wide-area projects. Moreover, Japan apparently lags far behind Europe and North America in its disclosure and enhancement of environmental information through cooperation between the government and NGOs/NPOs. The collection of environmental information and the utilization of databases by the government alone (local governments in particular) will face numerous difficulties, particularly in terms of cost, because the monitoring of environmental information entails a huge cost in the installation, operation and maintenance of measuring instruments. Besides building partnerships with environmental NPOs and raising the awareness of residents through

environmental education, consideration should also be given to introducing monitoring systems with the cooperation of residents[63].

The need to cooperate with non-governmental sectors indicates the importance of partnerships between the industrial, academic and public sectors. As regards systems related to environmental information, the development of various tools in private companies has been stimulated mainly by the implementation of the PRTR Law. In fact, the government does not have to operate all systems related to the environment; active outsourcing may be pursued. For example, environmental ASP services, increasingly active in Europe and North America, would help revitalize the domestic industry.

The implementation of environmental information policy must clearly consider the requirements of corporate management, such as the non-disclosure of expertise and technical information owned by businesses. The specific characters of environmental information (information related to toxicity and environmental burden in particular) should also be considered. Indeed, businesses often voluntarily disclose information related to toxicity for the purpose of environmental risk management, including data on soil pollution, which has been attracting attention recently. However, companies are always concerned about the dilemma of possible criticism from society as a result of disclosure. The government and local residents must refrain from preventing legitimate corporate activities.

3. Contents Issues

As mentioned in Chapter III, information technology has started to be used in Japan mainly for waste management. In some cases, data on waste movements, etc. are already available. The construction of databases on environmental information is advancing slowly but surely. However, environmental information recorded in the databases does not always reflect the most recent trends, and data are sometimes insufficient due to cost problems, etc.

At the same time, various questions have been raised concerning the availability of environmental information and the practice of information disclosure. As regards the methods of monitoring related to dioxin, for example, some point out that the current simulation technique does not appropriately consider constantly changing parameters such as meteorological conditions and traffic density, as measurements are only made at fixed points[64]. Further cooperation between industry, academia and government, as mentioned above, is necessary to overcome such shortcomings.

In order to evaluate performance with local environmental management systems, environmental management information including the local version of environmental accounting will need to be improved, along with ongoing research on environmental indicators. Contents essential for corporate activities and the daily life of residents will also have to be developed, such as soil pollution databases.

Consideration should be given to the characteristics of environmental information in

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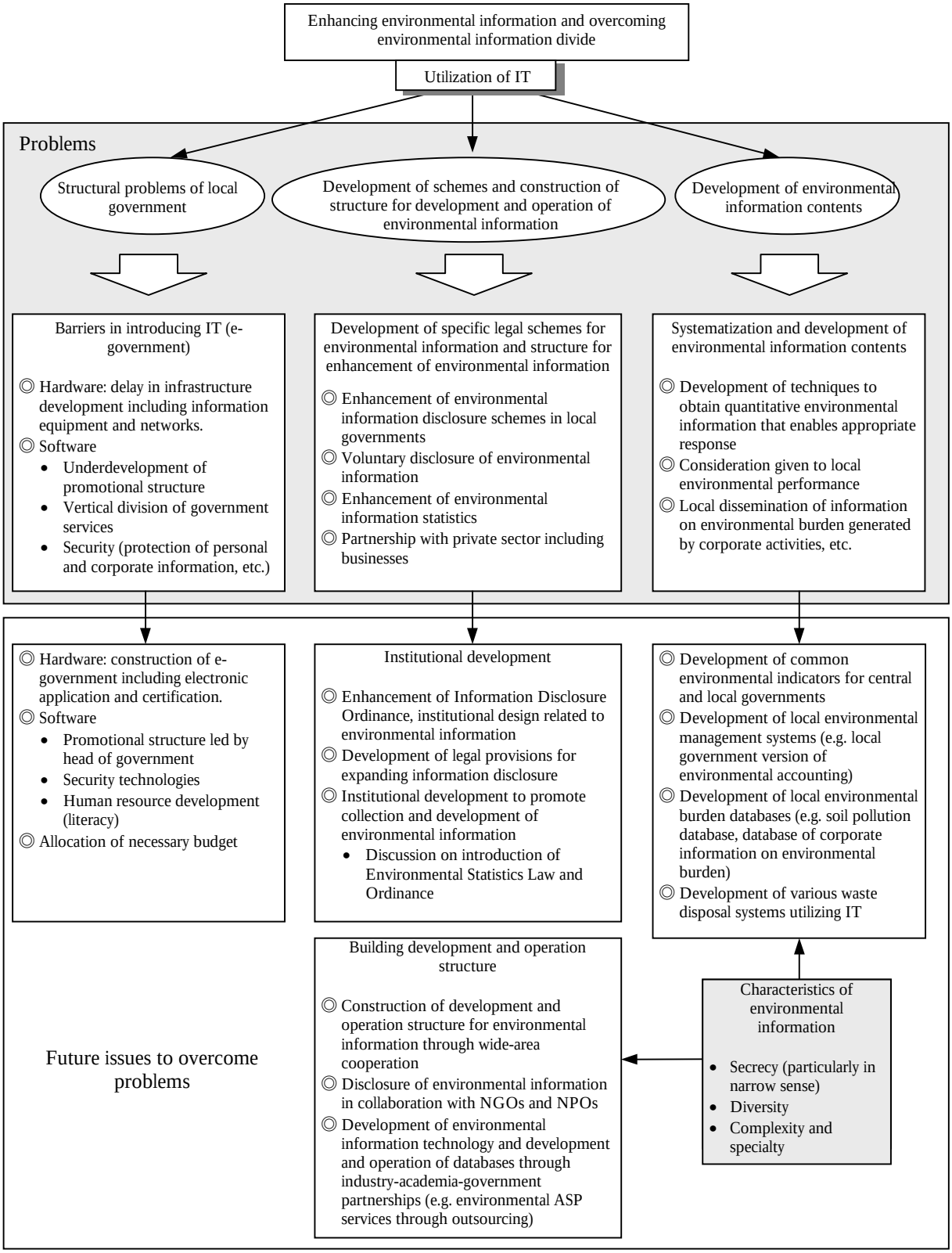
[63] It should be noted in this connection that pine needles have been utilized in some communities to estimate the average concentration of dioxin in the local atmosphere. Along with the reasonableness of the measuring technique itself, the collection of specimens (pine needles in this case) by local residents themselves is noteworthy as a tool of environmental information policy ("National Pine-needle Dioxin Survey with the Participation of Citizens").
Source: Yomiuri Shimbun, October 18, 2001, evening edition.

[64] For example, the relative position among measuring stations and approximate distribution of concentration may be defined by the system run by the Ministry of the Environment, but it is difficult to identify the distribution of concentration within a local area. In order to overcome this shortcoming, the Environmental Research Institute, an environmental think-tank based in Shinagawa Ward, Tokyo, developed a technique that utilizes atmospheric, meteorological and automobile information to reconstruct concentration along the road and in other areas in a colored concentration map (simulation). The technique has been introduced in Itabashi Ward and Ichikawa City among others.

addressing these issues. In any case, the many issues to be addressed in bringing about a shift of environmental administration paradigm require more than the efforts of a local government. They need to be overcome through coordinated efforts with support from the central government, in such forms as cooperation covering wide areas and mutual assistance among the industrial, academic and private sectors (including NGOs and NPOs).

[Nobuo Ino <e-mail: report@dbj.go.jp>]

Figure 4-2. Problems and Issues over Environmental Information Policy



Source: DBJ

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